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BETTER FRUIT

VOLUME IX

AUGUST, 1914

NUMBER 2



A CLUSTER OF HUNGARIAN PRUNES GROWN IN MORROW COUNTY
Prunes are grown extensively in Oregon, Washington and Idaho

BETTER FRUIT PUBLISHING COMPANY, PUBLISHERS, HOOD RIVER, OREGON

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Mr. W. A. Johnston of The Dalles shipped a car containing 200 Kimball Cultivators to Michigan, which is the first carload of implements ever manufactured in Oregon and shipped East. The Oregon-Washington Railroad & Navigation Company officials had the car spotted and Mr. Johnston had a photograph taken. On the side of the car was tacked a banner which read, "First Car of Agricultural Implements Made in the West and Shipped East. Kimball Cultivators, Manufactured by W. A. Johnston, The Dalles, Oregon."

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It not only preserves the moisture, but destroys the hiding places of insects, such as curculio, which are often serious orchard pests. Apples grown in cultivated orchards ripen later, and consequently keep longer. They are of larger size and are usually smoother.

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Note prices on various sizes quoted here. Send in your order at once, or write by return mail asking for booklets and particulars. All quotations are f.o.b. The Dalles, Oregon, but we will arrange to have a carload in some Eastern city for the spring of 1915, so that shipments may be made direct from that point.

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No. 4.	4½ feet, 6 blades; weight complete 70 lbs.....	Price \$13.50
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No. 9.	10 feet, 13 blades; weight complete 140 lbs.....	25.00
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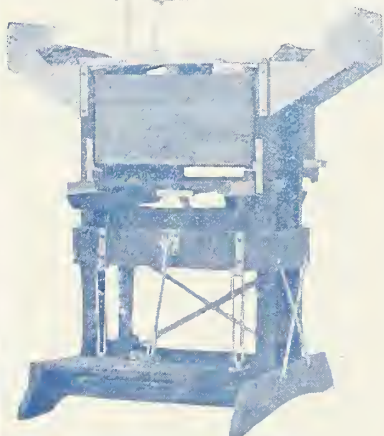
Extra Frames \$1.00 per foot; weight 10 lbs. per foot.

Extra Blades \$1.50 each; weight 5 lbs. each.

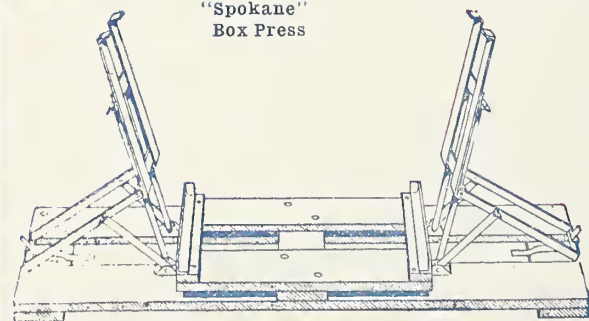
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Capital fully paid \$100,000.00

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We give special attention to good Farm Loans

If you have money to loan we will find you good real estate security, or if
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Plantation four miles southwest of station, Belmont Road

We will be pleased to show you trees, apple trees that have a heritage, a quality that should be considered by everyone who plants a tree. Our trees are grown in clean hillside virgin red soil with clay subsoil, producing the most vigorous root system. Our huds are selected from the best bearing healthy Hood River trees that make the Hood River apple famous throughout the world. Our trees will give you satisfactory results in vigor, fruit and quality. Ask for catalog. We guarantee our products. Apples, pears, peaches, apricots, almonds and walnuts. A complete line of the best varieties of all kinds of fruits.

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The largest and most successful orchard project
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7,000 acres planted to winter apples. Gravity irrigation. Located 22 miles north of Spokane, Washington, directly on the railroad. We plant and give four years' care to every orchard tract sold. \$125, first payment, secures 5 acres; \$250, first payment, secures 10 acres; balance monthly.

Send for booklet

Arcadia Orchards Company
 Deer Park, Washington

NOT AN EXPERIMENT

The Cutler Fruit Grader

Simple, durable, accurate and tested by experience

Built in five sizes. Each size may be enlarged later as your crop increases



A double capacity CUTLER GRADER as it now stands in the packing house of the Hood River Apple and Storage Company, after handling over 40,000 boxes last season. Read what they say below.

We ask you as businesslike fruit growers to read and weigh well every word of this advertisement. We not only think the CUTLER GRADER will save you money, but we know it will, because the records of growers using this machine last year prove that this saving ranges between 5 and 7 cents per box. Many of our customers saved the cost of their machines several times over the first season. We not only think it will run successfully without breakdown, but we know it will, because of the experience behind us. A small wrench and a screwdriver are all the tools you need. There are no complicated parts to be repaired while your men stand idle, no springs to weaken, no vibrating parts to jar loose.

Our principle is correct for flat, round or long varieties. Every apple is measured cheek to cheek. The accurate sizing almost doubles the output of the packer as proved by a season's averages. Again no guess about this. The fruit is handled gently, no violent action with liability of stem punctures or breakage of stems when handling pears. The CUTLER GRADER will handle a large output in a small space, and two grades at once, even with the smallest model. The carrier of this machine could size and deliver over 1500 boxes a day, but the working capacity of any machine is limited to the volume that can be packed at the bins. This machine has a greater working capacity, size for size, than any other machine on the market. This is chiefly because of the ability to control the delivery of the fruit into the bins, allowing all the packers to get to the fruit even when the variety runs principally to two or three sizes. A machine without this delivery control runs a variety of this kind into a few bins, leaving the other bins useless, cutting down the number of packers that can be used. It takes but a moment's adjustment of the CUTLER GRADER to spread these crowding sizes into adjacent bins. Our small model is admirably suited for the individual grower. It handles two grades (a very necessary feature), is only 16 feet by 7 feet, requires less than $\frac{1}{2}$ horsepower, and can be enlarged later by addition of sections.

RESULTS—NOT THEORIES

Note what a few of our many satisfied customers write us
AFTER A FULL SEASON'S TRIAL

Hood River, June 20, 1914.
Cutler Fruit Grading Machine Co., Hood River, Oregon.

Gentlemen: Replying to your further inquiry in regard to the grading machine which we bought from you last year, we are pleased to state that it was a splendid success. We experienced no trouble in operating the machine and the exact records of costs which we have kept for several years show your machine saved 5 cents per box. We handled nearly 10,000 boxes in a 30x40 tent, and realize that without your machine to move the fruit quickly we undoubtedly would have lost heavily from bad picking weather. Your method of sorting the fruit, where the sorter inspects each apple as he places it in the carrier, proved very satisfactory to us, and we believe it to be one of the strongest features of your machine where accurate sorting is desired. The machine, we believe, paid for itself several times over the first season and we wish you every success. Yours truly, DICKERSON & PECK, (signed) W. B. Dickerson.

Demand is active and our output is limited,
so write before it is too late to

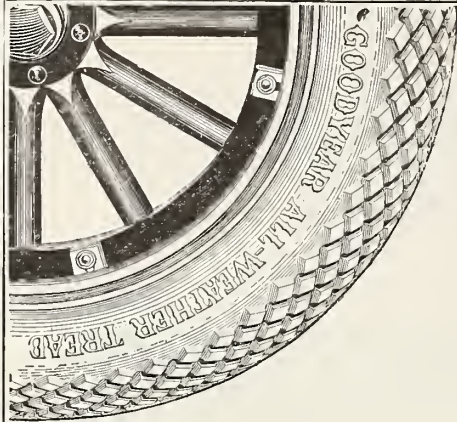
Hood River, Oregon, May 28, 1914.
Cutler Fruit Grading Machine Co., Hood River, Oregon.

Dear Sirs: Replying to your inquiry, I am pleased to state that the machine which you installed in my packing house last fall saved me from 6 to 7 cents per box, and made it possible to handle a much greater quantity of fruit in the packing room than we could in previous years. The two regular packers whom I employed averaged 121 boxes each in 10 hours through the entire season. These same packers, working for me the previous year, did not average over 65 boxes each per day. The machine paid for itself several times over in the one season. Very truly yours, (signed) W. E. SHERMAN, Hood River, Oregon.

May 28, 1914.
Cutler Fruit Grading Machine Co., Hood River, Oregon.

Dear Sirs: We used one of your double capacity Grading Machines last season from October 1st to January 4th, without any loss of time, due to the machine, and packed out over 40,000 boxes. We found that eight men sorting and feeding into the machine brought our daily output up to an average of 800 boxes per day, when running full crew. We believe your machine to be superior to the other makes that we have seen or used. Yours very truly, (signed) THE HOOD RIVER APPLE & STORAGE CO., Per M. M. Hill.

The Cutler Fruit Grading Machine Co., Hood River Oregon



One-Third More for Tires

16 makes of tires now sell for more than Goodyear prices. Half of them cost about one-third more. As compared with them, Goodyears save you 25 per cent in original cost alone.

Don't Pay It

Don't pay those extra prices. The evidence is that Goodyear tires are the best tires built today. They outsell any other, and they won that place by millions of mileage tests.

No man knows how to build a tire to give you lower cost per mile. No other maker combats tire troubles as we do in Goodyear tires.

Any higher price means added cost of upkeep without any compensation. In most cases, that higher price is due to limited production.

Save This 25%

We used to charge you extra prices for Goodyear No-Rim-Cut tires. That was because of exclusive, costly features.

Those tires are built the same today. They have the same exclusive features. But we now build ten tires where we then built one. We have modern equipment, new factory efficiency. Our prices came down as our costs came down. They are half what they used to be.

Accept this saving. It is one of our greatest

accomplishments. The price of the leading tire of the world is all that you should pay.

Exclusive Features

These four features of No-Rim-Cut tires are found in no others at any price:

Our No-Rim-Cut feature, which wipes out rim-cutting completely.

Our "On-Air" cure, which saves all the countless blow-outs due to wrinkled fabric. This one exclusive feature adds to our tire cost \$1,500 daily.

Our patent method for combating tread separation. It reduces this danger by 60 per cent.

Our All-Weather tread—our double-thick, resistless anti-skid which, because of its flatness, runs as smoothly as a plain tread.

Note that these are all exclusive Goodyear features. No other tire offers one of them. Every year they are saving our tire users many millions of dollars.

You will get them all, at the Goodyear price, if you ask your dealer for No-Rim-Cut tires. Any dealer can get them quickly if your size is not in stock.



The Goodyear Tire & Rubber Company, Akron, Ohio

Toronto, Canada

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Mexico City, Mexico

Branches and Agencies in 103 Principal Cities. Dealers Everywhere.

Write Us on Anything you Want in Rubber.

(1688)

BETTER FRUIT

AN ILLUSTRATED MAGAZINE PUBLISHED MONTHLY IN THE INTEREST OF MODERN, PROGRESSIVE FRUIT GROWING AND MARKETING

The Compatibility of Insecticides

Mr. George P. Gray, before the State Fruit Growers' Convention, Davis, California, June 1-6, 1914

THE cost of crop-pest insurance by means of spraying is no small burden to most producers, who are often confronted with the necessity of making frequent applications of various remedies to insure their products against the ravages of insect and fungous parasites. At times it must almost seem that if the necessary thought and time were given to the proper application of the appropriate treatment at the right time little energy would be left for cultivation, harvesting or other necessary operations. The cost of spray materials is no small item, but is usually insignificant as compared to the cost of application. One way of reducing the latter expense is by combination spraying, that is, by mixing two or more spray materials and applying them together. In mixtures of this sort grave chemical changes may take place

of combination sprays and the results have been published in the bulletins of the United States Department of Agriculture, the state experiment stations and in agricultural journals. These reports are scattered through so many publications and the conclusions are at times so conflicting that no inconsiderable amount of time must be spent in a search of the literature to arrive at a definite conclusion as to the suitability of applying some particular remedy in combination with another. In order to bring this information into more available form and of more easy access, it has been condensed into tabular form and a compatibility table is presented for your consideration with the hope that it will be of some assistance in warning you of obscure dangers that may lurk in apparently harmless mixtures.

perament" is a phrase often seen in the newspapers, and its meaning may be described as a state of affairs in which trouble is precipitated whenever two opposing tempers come in contact. Incompatibility is the state of being incompatible. In pharmacy the terms are often used, and usually a whole chapter is devoted to the subject in works on the practice of pharmacy. As applied to medicines, incompatibility is of three different types and may be defined as follows: Incompatible: (1) Chemically—Not capable of being united in solution without liability to decomposition or other chemical change. (2) Therapeutically—Not suitable to be prescribed together because of opposing medicinal qualities. (3) Physically—Not suitable to mixed on account of liability to produce undesirable physical change. In a broad sense, it seems that the word may be applied to insecticides and fungicides. The distinctions made between the different sorts of incompatibilities as applied to pharmacy might also be applied in a general way to spray mixtures. To avoid technicalities, however, it seems best to divide mixtures of insecticides and fungicides into five classes designated by letters.

Classification of Mixtures

The key to classification is briefly given at the bottom of the table for convenient reference. A little fuller statement is desirable and is as follows:

Class A-1, compatible mixtures in which the chief constituents remain practically unchanged but are less liable to decomposition after application, or in which an undesirable constituent has been neutralized or rendered less soluble. Mixtures in which the spreading or adhesive qualities are improved are also included in this class.

Class A, compatible mixtures in which no important chemical or physical changes occur.

Class B, incompatible chemically, but compatible in respect to use ("therapeutically" and "physically"). Efficient, non-injurious. Mixtures in which important chemical changes occur but the original killing or preventive properties and physical properties are not impaired, and no injurious new compound is formed.

Class C, incompatible chemically and also incompatible in respect to use ("therapeutically" or "physically" or both). Inefficient, non-injurious. Mixtures in which important chemical or physical changes occur and render a part or all of the original ingredients

COMPATIBILITY TABLE—INSECTICIDES AND FUNGICIDES

		Fungicides			Contact Insecticides						
		Bordeaux	Lime-Sulphur	Iron Sulfid	Cyanid Fumigation	Tobacco	Soaps	Emulsions	Alkalies	Acids	
Stomach Poisons (Arsenicals)	Paris Green.....	A-1	D	A-1	D	?	D	D	D	D	
	Calcium Arsenite.	A	D	A		A	D	D	D	D	
	Lead Arsenate ... (Acid)	A-1	?	A-1		A	D	D	D	C	
	Lead Arsenate (Neutral)	A	B	A		A	A	A	A	D	
	Zinc Arsenite	?	D	A-1		A	D	D	D	D	
Contact Insecticides	Lime-Sulphur.....	?	—	—	A	A	C	D	C	C	
	Emulsions.....	?	D	C		A-1	A	—	D	D	
	Soaps	{ A-1 or B }		C	C	A	—	—	A	C	
	Tobacco	{ C or D }		A	A	A	—	—	—	B	A
	Cyanid Fumagat'n	D	A								
Acids		D	C	D					C		
Alkalies ...		B	C	D							
Class											
A-1—Better results by mixing					Compatible						
A—Properties not changed by mixing											
B—Efficient, non-injurious					Incompatible, chemically						
C—Inefficient, non-injurious											
D—DANGEROUS MIXTURE											
[Arranged by Geo. P. Gray]											

which render the mixture wholly unfit for use. On the other hand, the original ingredients may remain unchanged or may be improved by their new associates. Numerous experiments have been made to determine the advisability

The word "compatibility" or its opposite, "incompatibility," may seem odd as used in this connection, but it seemed to be the best word that presented itself, applied in the sense to be later described. "Incompatibility of tem-

inert, or less active, or physically unsuitable for use, but not necessarily injurious to the host of the parasite.

Class D, incompatible chemically and also incompatible on account of injurious properties ("therapeutically" or "physically" or both). Dangerous mixtures. Mixtures in which important chemical changes occur and render all or a part of the original constituents injurious to the host of the parasite. It so happens that D stands for dangerous and the table has been so arranged that dangerous mixtures are thus easily recognized by associating the letter which designates the class with the word.

Interpretation of the Table

The point must be brought out and strongly emphasized that it is not intended to recommend any particular mixture shown in the table in preference to any other. That is not the purpose of the table. For example, an A-1 mixture is not necessarily a better mixture to use than an A mixture. The comparison is not between the mixtures themselves but is intended to be made solely between the mixture and the original ingredients of the mixture; the classification is intended to show the effect of mixing only. It is seen by looking at the table that a paris green-bordeaux combination is classed as A-1 and a neutral lead arsenate-bordeaux combination is classed as A. This classification is not intended to mean that the first combination is safer to use than the latter, but that the paris green-bordeaux combination is safer to use than paris green alone and that neither benefit nor harm results from the mixing of neutral lead arsenate and bordeaux.

Arsenical-Fungicide Combinations

Bordeaux.—Again referring to the table, it is seen that both paris green and acid lead arsenate are improved by mixing with bordeaux. This is on account of the excess of lime in the bordeaux as now commonly used. The lime forms a fairly insoluble compound with the soluble arsenic in paris green and acts in the same capacity after spraying if any soluble arsenic is formed by the action of the weather upon paris green or acid lead arsenate. Calcium arsenite cannot be improved in this way, as this arsenical is made with an excess of lime and the additional lime of the bordeaux could not make it more safe to use. No safer arsenical is known than neutral lead arsenate; therefore no added safety would result by admixture with bordeaux. Insufficient data is at hand to warrant the classification of the zinc arsenite-bordeaux combination.

Lime-Sulphur.—Lime-sulphur is now coming to be a very formidable rival to bordeaux mixture and the other copper fungicides, and is also extensively used as a contact insecticide. Hence it is often desirable to mix this valuable remedy with an arsenical. For this purpose the choice of arsenicals is limited to lead arsenate, and very likely should be entirely restricted to the

neutral type. Lime-sulphur is a very unstable compound and is easily decomposed by slight influences, and is especially susceptible to change when mixed with other spray materials. This fact is evident when it is noticed that only two of its combinations are in class A. Its own decomposition products are quite harmless, but its effect on its associates is very frequently of a serious nature. Particularly is this true of its effect upon the arsenites (paris green, calcium arsenite and zinc arsenite). The arsenites in general are less stable compounds than the arsenates and are prone to yield soluble arsenic in either alkaline or acidic solutions. The acid lead arsenate is also unstable in alkaline solutions. Lime-sulphur is of an alkaline nature, and therefore the various arsenical-lime-sulphur mixtures must all be placed in the dangerous class, with the exception of the neutral lead arsenate, and possibly with the exception of the acid lead arsenate under certain favorable conditions. Instances are known in which acid lead arsenate and even paris green have been sprayed in combination with lime-sulphur without apparent injury to foliage, but it is thought that cases of this kind are very rare and must have been done under unusually favorable climatic conditions. The acid lead arsenate-lime-sulphur combination is given a question mark in the table for the reason that many of the reports of experiments make no mention of the type of lead arsenate used. Where the distinction is made, however, the neutral type is favored.

Iron Sulfid.—The so-called iron-sulfid fungicide is prepared by mixing a solution of iron sulphate with an excess of lime-sulphur solution. There results a mixed precipitate of insoluble iron sulfid (black), free sulphur (yellowish) and calcium sulphate (white). The excess of lime-sulphur is washed out and there is left a paste of the three precipitates which are quite insoluble and inert toward most ordinary reagents. The iron sulfid is black and is present in sufficient quantity to mask the presence of the other precipitates. The free sulphur is believed to be the only constituent of fungicidal value, the others being merely incidental to this economical manner of precipitating free sulphur in a finely divided form. The iron sulfid and calcium sulphate also serve to prevent the minute particles of sulphur from flocculating (i. e., uniting to form coarser grains). From the above description, the iron sulfid being composed of fairly insoluble and inert substances, it may be inferred that this material may be mixed with any of the arsenicals without fear of materially affecting their composition. In some cases the liability of arsenical foliage injury is reported to be lessened by the presence of the fungicide in question.

Other Free Sulphur-Paste Preparations.—Recently there have come into the market other forms of finely divided free sulphur mixed with deflocculating agents, notably "atomic sul-

phur" and "milled sulphur." These two preparations are composed of free sulphur ground to an impalpable powder in the presence of a small quantity of some material to prevent the flocculation of the particles and enough water to form a paste. Sulphur in its elementary form (free sulphur) is insoluble in most liquids except the alkalis and is indifferent to the influence of most of the substances present in the various sprays. The deflocculating agents are in small quantity and are believed to have no detrimental affect. Being of so recent origin and of the nature of proprietary preparations, these are not included in the table. So far as shown in printed reports and from personal observation, it is thought that "atomic sulphur" and "milled sulphur" may be used with safety in combination with the different arsenicals.

Potassium and Sodium Sulphids (Liver of Sulphur, Sulphide of Potash, Soda, etc).—Solutions or fusions of sulphur, in soda or potash lyes, have long been known as efficient fungicides and have been more or less used as dormant sprays. Their causticity has prevented their very wide application as a foliage spray and few attempts are reported to combine materials of this nature with the arsenicals. As noted in the reports that are at hand, however, the results of such combinations have been disastrous, as might be expected, considering the susceptibility of most arsenicals to the influence of alkalis. Interest in fungicides of this class has recently been somewhat revived through the introduction into the state of a proprietary preparation known as "Soluble Sulphur," offered as a substitute for lime-sulphur. This preparation is very similar in composition to liver of sulphur, the chief difference being that the former is combined with a sodium base, while the latter is combined with a potassium base. From a consideration of the nature of the materials in question (potassium and sodium sulphids, variously known as liver of sulphur or sulphide of potash and sulphide of soda, and "soluble sulphur") a combination spray composed of any of these sulphids and any arsenical except the neutral lead arsenate would be very injurious when applied to foliage. It is thought that the only possible arsenical to use with these alkali sulphids is the neutral lead arsenate, and even this opinion is not given with absolute certainty in the absence of definite data.

Arsenical-Contact Insecticide Combinations

Tobacco.—So far as known the various forms of tobacco preparations are compatible with the arsenicals, paris green being a possible exception. (See Tobacco-Bordeaux.)

Soaps.—As previously noted in the discussion of arsenicals-lime-sulphur, the arsenites and the acid lead arsenate are all unstable in the presence of alkalis. The alkalis of soaps, therefore, prohibit their use with the ar-

Continued on page 35

Grade Rules North Pacific Fruit Distributors, Season 1914

RECOMMENDATIONS of Grade and Pack Conference, composed of accredited representatives and experts from all sub-central districts, acting in concert with chief inspectors, sales managers, district managers and branch office managers. Unanimously approved and adopted by the board of trustees of the North Pacific Fruit Distributors, in regular session, May 18, 1914.

APPLES

The grades to be used will be designated as Extra Fancy, Fancy, and "C" grade, and defined as follows:

Extra Fancy—This grade shall consist of sound, smooth, matured, clean, hand-picked, well-formed apples only; free from all insect pests, disease, blemishes, bruises and other physical injuries, scald, scab, scale, sun scald, dry or bitter rot, worms, worm stings, worm holes, spray burn, limb rub, visible water core, skin puncture or skin broken at stem. All apples must be of good matured color, shape and condition characteristic of the variety.

The following varieties defined as to color shall be admitted to this grade: Solid Red Varieties—Aiken Red, Arkansas Black, Baldwin, Black Ben Davis, Gano, Jonathan, King David, McIntosh Red, Mammoth Black Twig, Missouri Pippin, Spitzenberg (Esopus), Vanderpool, Winesap. Striped or Partial Red Varieties—Ben Davis, Delicious, Gravenstein, Hubbardston Nonsuch, Jefferis, Jeniton, Kaighn Spitz, King of Tompkins County, Northern Spy, Rainier, Rome Beauty, Staymen, Snow, Wealthy, Wagener, York Imperial.

Color requirements of Extra Fancy are as follows: Solid red varieties to have not less than three-fourths good red color. Sizes 175 and smaller, when admitted to this grade, must have 90 per cent good red color. Striped or partial red varieties, as designated above, to have not less than one-half good red color. Sizes 175 and smaller, when admitted to this grade, must have at least 75 per cent good red color, except that Gravenstein, Jefferis and King

of Tompkins County in all sizes must be at least one-fourth good red color, and McIntosh Red in all sizes must have at least two-thirds good red color. Red cheeked or blushed varieties, such as Hydes King, Red Cheek Pippin, Maiden Blush and Winter Banana, must have a blushed cheek. Ortley must be white, yellow or waxen. Yellow or green varieties, such as Grimes Golden, White Winter Pearmain, Yellow Newtown and Cox's Orange Pippin, must have the characteristic color of the variety.

No sizes admitted to this grade smaller than as follows: Aiken Red, 200; Arkansas Black, 200; Baldwin, 200; Ben Davis, 163; Black Ben Davis, 163; Cox's Orange Pippin, 163; Delicious, 150; Gano, 163; Grimes Golden, 200; Gravenstein, 200; Hubbardston Nonsuch, 150; Hydes King, 150; Jeniton, 200; Jonathan, 200; Jefferis, 200; King of Tompkins County, 163; King David, 200; Maiden Blush, 163; McIntosh Red, 200; Missouri Pippin, 200; Mammoth Black Twig, 150; Northern Spy, 163; Ortley, 163; Rainier, 163; Rome Beauty, 163; Red Cheek Pippin, 163; Spitzenberg (Esopus), 200; Staymen, 163; Snow, 200; Vanderpool, 163; Winesap, 200; Wagener, 200; Winter Banana, 150; White Winter Pearmain, 200; Wealthy, 200; Yellow Newtown, 200; York Imperial, 163.

All boxes to be lined and carboard used top and bottom. No cardboard to be used between layers in sizes smaller than 88s. No apples will be accepted in boxes showing infection of worms or cocoons. All apples to be wrapped.

Fancy Grade—In this grade all apples must be matured, hand picked, clean and sound, free from all insect pests, diseases, stings, scald, scale, sunscald, dry or bitter rot, worm, worm stings or worm holes, spray burn, visible water core, skin puncture or skin broken at stem. Slight leaf rubs, scratches or russetting will be permitted up to a total of one inch in diameter in sizes 125 and larger; three-fourths inch diameter in sizes 138 to 163 inclusive; one-half inch in diam-

eter in sizes 175 and smaller. Limb rubs will be permitted showing an aggregate area in the various sizes of one-half the above. No apple shall show total blemishes aggregating more than one inch in diameter in sizes 125 and larger; three-fourths inch in diameter in sizes 138 to 163 inclusive, and one-half inch in diameter in sizes 175 and smaller. Fruit clearly misshapen, bruised or bearing evidence of rough handling shall not be permitted in this grade. The varieties admitted to this grade are the same as in the Extra Fancy.

Color requirements are as follows: The solid red varieties must have fully 40 per cent good red color, except McIntosh, which must have fully 30 per cent good red color. Sizes 175 and smaller, when admitted to this grade, must have at least 75 per cent good red color, except McIntosh, which must have at least 60 per cent good red color. Striped or partial red varieties must have at least one-fourth good red color. Sizes 175 and smaller, when admitted to this grade, must have at least 50 per cent good red color, except that Gravenstein, Jefferis and King of Tompkins County must have at least 10 per cent good red color. Sizes 175 and smaller, when admitted to this grade, must have at least 20 per cent good red color. Red cheeked or blushed varieties must have correct physical qualities with tinge of color. All apples of green or yellow variety shall be of a characteristic color.

No size shall be admitted to this grade smaller than as follows: Aiken Red, 200; Arkansas Black, 163; Baldwin, 163; Ben Davis, 163; Black Ben Davis, 163; Cox's Orange Pippin, 150; Delicious, 150; Gano, 163; Grimes Golden, 200; Gravenstein, 200; Hubbardston Nonsuch, 150; Hydes King, 150; Jeniton, 200; Jonathan, 200; Jefferis, 200; Kaighn Spitz, 200; King of Tompkins County, 163; King David, 200; McIntosh Red, 200; Maiden Blush, 163; Mammoth Black Twig, 150; Missouri Pippin, 200; Northern Spy, 163; Ortley, 163; Rainier, 163; Rome Beauty, 163; Red Cheek Pippin, 150; Spitzenberg (Esopus), 200; Staymen, 150; Snow, 200; Vanderpool, 150; Winesap, 200; Wagener, 200; Winter Banana, 150; White Winter Pearmain, 200; Wealthy, 200; Yellow Newtown, 200; York Imperial, 163.

All boxes to be lined and cardboard to be used top and bottom, but no cardboard to be used between layers in sizes smaller than 88s. No apples will be accepted in boxes showing infection of worms or cocoons. All apples to be wrapped.

Combination (Extra Fancy and Fancy Grades Packed Together)—The following apples to be packed in one grade, combining the Extra Fancy and Fancy grades, as provided by these grading rules covering Fancy grade, except that no size to be smaller than 163 count. This pack to be marked or

PEARS—SIZES (INCHES) BY GRADES AND WEIGHTS OF PACKAGES

Variety	Extra Fancy				Fancy			C Grade	Weight
	First Picking		2nd and 3rd Picking		First Picking		2d-3d Pick'g	For Season	
	Young Trees	Old Trees	Young Trees	Old Trees	Young Trees	Old Trees	All Trees	All Trees	
Bartlett	2½	2¼	2¼	2	2½	2¼	2	2¼	50-53
Beurre d'Anjou	2½	2¼	2¼	2	2½	2¼	2	2¼	47-50
Beurre Bosc	2½	2¼	2¼	2	2½	2¼	2	2¼	47-50
Beurre d'Easter	2½	2¼	2¼	2	2½	2¼	2¼	2¼	48-52
Beurre Clairgeau	2½	2¼	2¼	2	2½	2¼	2¼	2¼	48-52
Clapp's Favorite	2½	2¼	2¼	2	2½	2¼	2¼	2¼	48-52
Comice	2½	2¼	2¼	2	2½	2¼	2	2¼	47-50
Duchess	2½	2¼	2¼	2	2½	2¼	2	2¼	48-52
Flemish	2½	2¼	2¼	2	2½	2¼	2¼	2¼	48-52
Fall Butter	2½	2¼	2¼	2	2½	2¼	1¾	2¼	48-52
Garber	2½	2¼	2¼	2	2½	2¼	2¼	2¼	48-52
Howell	2½	2¼	2¼	2	2½	2¼	2¼	2¼	48-52
Idaho	2½	2¼	2¼	2	2½	2¼	2¼	2¼	48-52
Jersey	2½	2¼	2¼	2	2½	2¼	1¾	2¼	48-52
Kieffer	2½	2¼	2¼	2	2½	2¼	2	2¼	48-52
La Comte	2½	2¼	2¼	2	2½	2¼	2¼	2¼	48-52
Miscellaneous large	2½	2¼	2¼	2	2½	2¼	2¼	2¼	48-52
Miscellaneous small	2½	2¼	2¼	2	2½	2¼	2¼	2¼	48-52
Seckel	2½	2¼	2¼	2	2½	2¼	2	2¼	48-52
Vicar of Wakefield	2½	2¼	2¼	2	2½	2¼	1¾	2	48-52
Winter Nelis	2½	2¼	2¼	2	2½	2¼	2¼	2¼	48-52
Winter Bartlett	2½	2¼	2¼	2	2½	2¼	2	2¼	48-52
Walla Walla Seedling	2½	2¼	2¼	2	2½	2¼	2	2¼	48-52

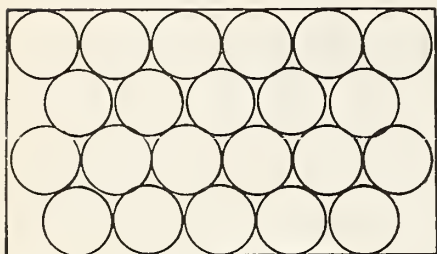
† Face in 4½-inch peach box.

‡ No C grade.

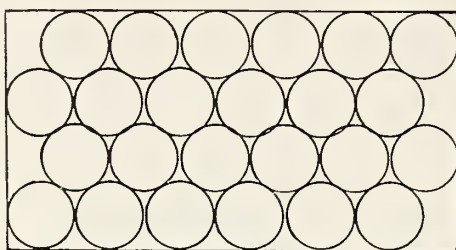
Wrap—Do Not Line—Face Bottom, All Grades.

Continued on page 29

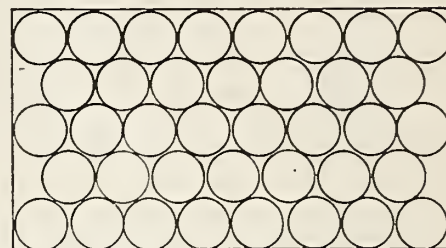
Illustrations for Apple Packs in the Standard Apple Box 10½x11½x18 Inches, Inside Measurements



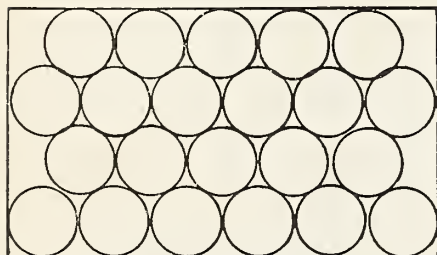
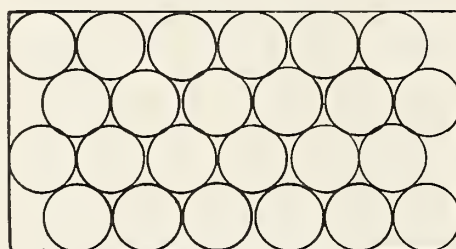
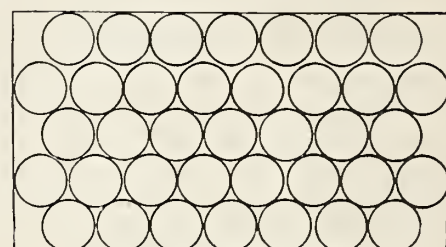
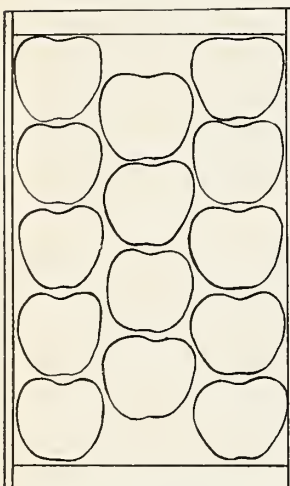
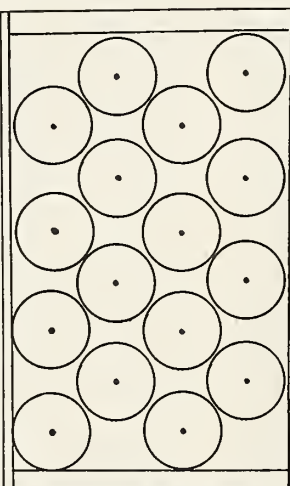
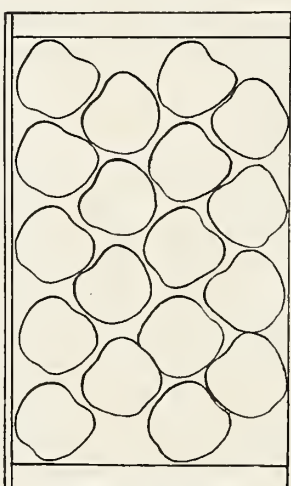
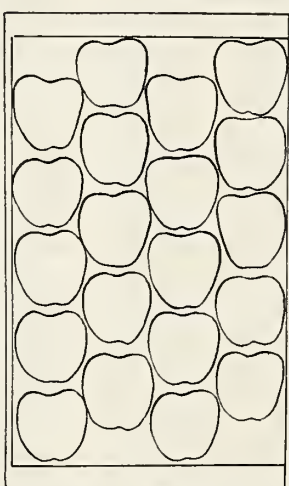
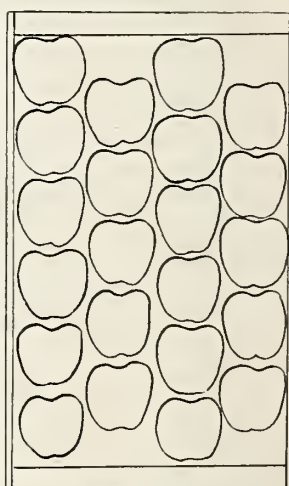
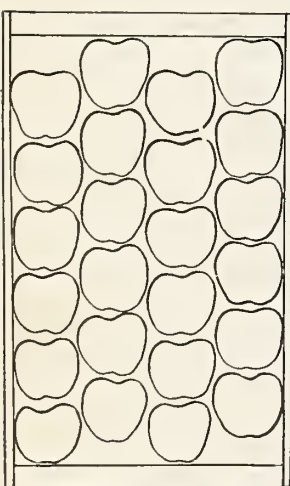
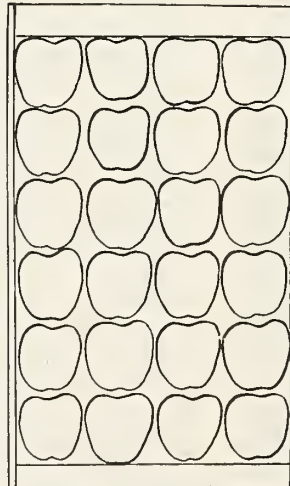
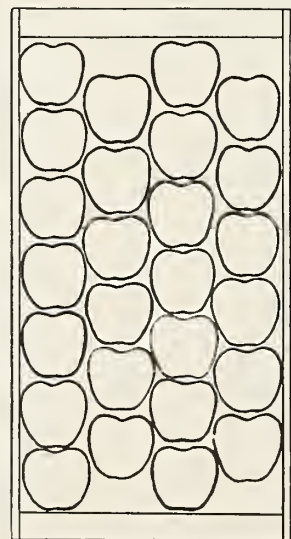
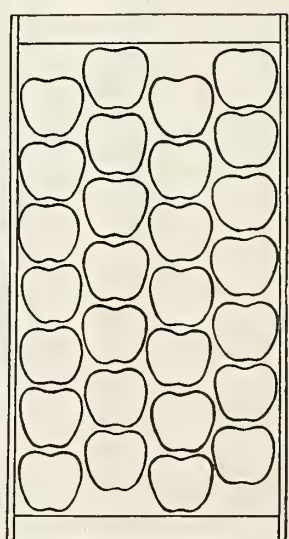
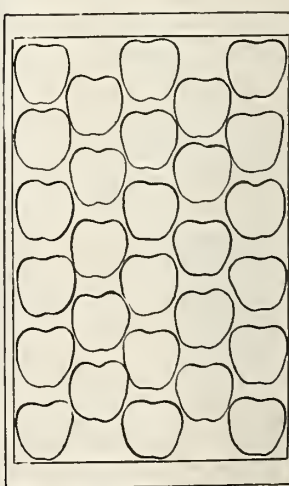
First and Third Layers



First and Third Layers



First, Third and Fifth Layers

Second and Fourth Layers
Diagonal 2/2 pack, 4 layers, 88 applesSecond and Fourth Layers
Showing diagonal 2/2 pack, 4 layers, 96 applesSecond and Fourth Layers
3/2 pack, 4½ tiers, 5 layers, 188 apples
If layers are reversed there will be 187 applesFigure 1—41 Apples
Northwest Standard BoxFigure 7—64 Apples
Northwest Standard BoxFigure 8—72 Apples
Northwest Standard BoxFigure 10—80 Apples
Northwest Standard BoxFigure 12—88 Apples
Northwest Standard BoxFigure 13—96 Apples
Northwest Standard BoxFigure 14—96 Apples
Northwest Standard BoxFigure 16—104 Apples
Northwest Standard BoxFigure 18—112 Apples
Northwest Standard BoxFigure 24—138 Apples
Northwest Standard Box

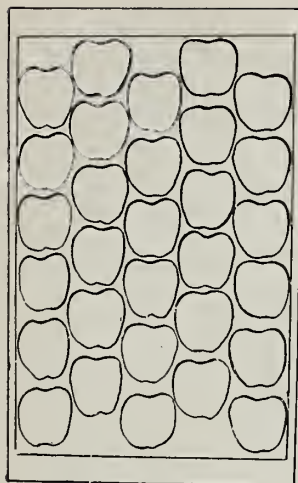


Figure 26—150 Apples
Northwest Standard Box

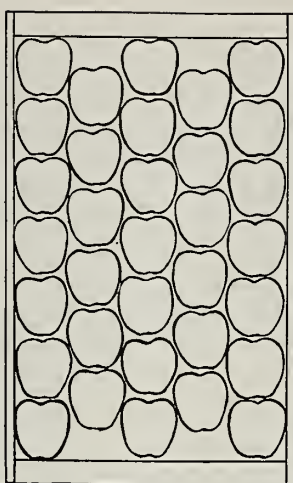


Figure 28—163 Apples
Northwest Standard Box

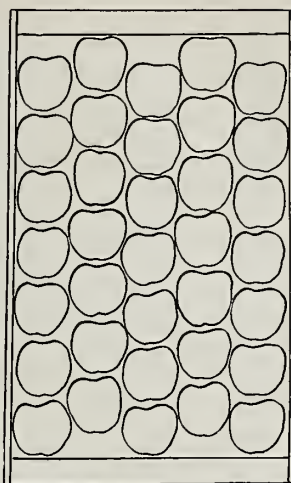


Figure 29—175 Apples
Northwest Standard Box

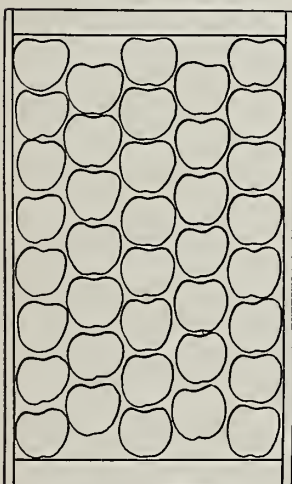


Figure 31—188 Apples
Northwest Standard Box

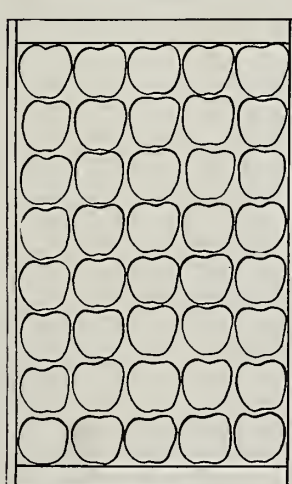


Figure 32—200 Apples
Northwest Standard Box

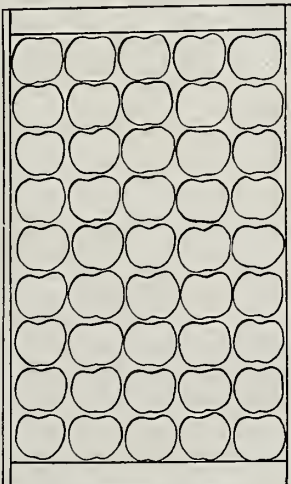
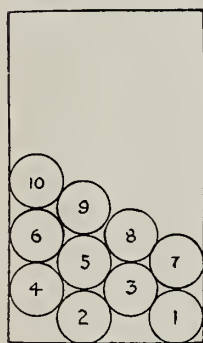
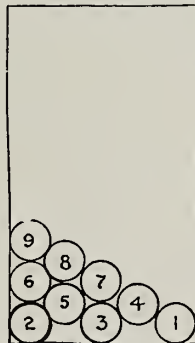


Figure 33—225 Apples
Northwest Standard Box



How to Start a 2/2
Diagonal Pack



How to Start a 3/2
Diagonal Pack

NOTE: It being impossible to get cuts made of the 113 and 125 packs, we trust the following explanation will be sufficiently clear. The 113 pack is made similar to 138 pack, consisting of five layers and five rows, the rows having five apples in the long rows and four apples in the short rows, respectively. The 125 pack is packed similar to the 138, consisting of five layers, with five rows in the layer, each row being five apples long.

Interest of the Railroads in the Fruit Industry

Mr. R. M. Roberts, before State Fruit Growers' Convention, Davis, California, June 1-6, 1914

THE discussion this evening is relative to the interest, one with the other, of the fruitgrower and the railroad. With your permission I desire to broaden this somewhat, that it may include the farmer and not alone the fruitgrower. The principles applicable to a part are applicable to the whole. It is to overwork a platitude to say that the interests of the railroad and the farmer are identical. They are identical and always will be. The great problem is to determine what procedure will best conserve the interests of both.

All of the larger railway systems are feeling their way in an endeavor to solve the problem, and it is in relation to the methods adopted by the Santa Fe system that I wish to speak.

Now let us see just what the problem is. The railroads above all things desire settlers to build up and develop unoccupied territory. In addition, they naturally desire the best possible prosperity in sections already developed, as the prosperity of the railroad is relative to that of the farmer. In years past the moving of the farmer from one

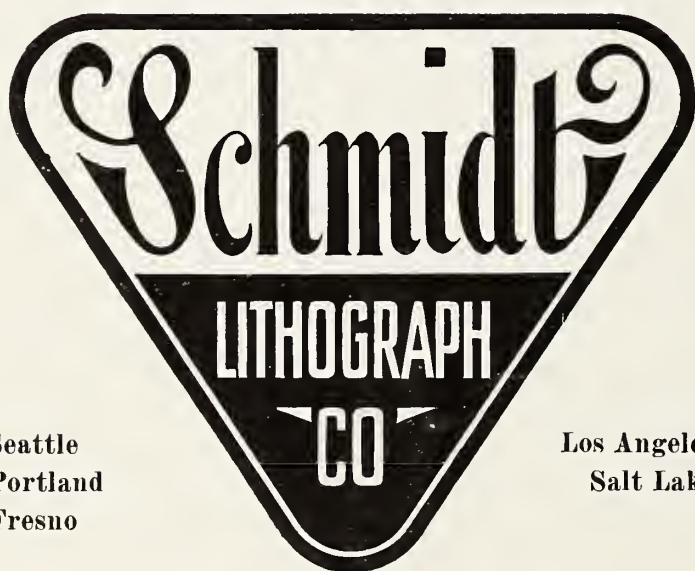
part of the country to another was not an exceedingly difficult matter. A few well-chosen words, a little waving of the great American flag and the lure of that which was "out yonder and over the hill" accomplished the desired result. They moved by thousands to the land of promise, often to find that they had not yet quite reached the end of the rainbow. Other countries looked on and copied. Canada in the past few years has taken from the Middle West 100,000 good American farmers and probably one hundred million of good American dollars. Both have been absorbed in the upbuilding of the lands of our northern friends. Few of these farmers have returned. They have found it almost impossible. The way of this does not concern us here tonight, but I simply use it to illustrate the increasing difficulty in the way of the American general colonization agent. Middle-Western farmers are increasingly prosperous and correspondingly harder to move. The cream of the Middle West has been skimmed. The real farmer, the man who is needed, he with some little capital, is, I say, difficult to move and this fact must be faced.

The great body of successful settlers from now on will be the plain man, with rather too little capital and probably not well equipped by way of agricultural knowledge to cope with California conditions and methods. That other hope of the man with a country to develop, the man from the city, is a problem of another sort. To pass over him quickly, I can only say that in the main, unless he is well protected by way of capital or income, he is possibly best advised when told to go slow and perhaps advised to remain where he is and practice plain, old-fashioned thrift as a method of "get rich quick." Our one great hope is the real farmer, with some capital, a strong back and not too weak mind. It is with this man that we are vitally concerned, and the corporation which I have the honor to represent is blazing a trail in California which we hope will prove a worthy path to follow. In this work, so far as conducted in California, we have the hearty support of this increasingly great and serviceable agricultural college of the State of California.

Now we are in the business of securing settlers, in developing a great country and also,—and to me this is the most important thing,—we are aiding them to become, as rapidly as possible, self-supporting and prosperous. Certainly the requirements of colonization and settlement are not being ignored. Let us mention briefly these requirements. The first is that the prospective settler be not encouraged, nor allowed if possible, to take up land when he is ill equipped by way of capital and skill in farming to successfully fight the battle. To this end we endeavor to find out, before the man and his family leaves his Eastern home, whether or not he is likely to become a successful settler. He is informed

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truthfully as to the conditions he must face and advised as well as possible of his chances of success. To avoid paternalism, he is encouraged to use his own judgment and take full advantage of all avenues of information, such as the college of agriculture and the farm advisers. He is further urged not to buy "unsight and unseen," but make a personal investigation of the country before purchasing. Should he decide to make the venture, he is offered the services of the agricultural demonstrator in gaining the knowledge of that country best adapted to the kind of farming he wishes to pursue.

I find that there is a tendency on the part of the settler to over-buy, to load up with too much land and too much responsibility. The result of this is to discourage this new man, both physically and financially, and we take great pains to advise these new citizens of California as to what they may expect and what can be done with a given area of ground. Once he has selected his land, it is the business of the demonstrator to call as often as seems advisable and consult with this "new beginner," if I may call him such, as to the layout of his farm, what crops, how, when and where to plant, proper farming implements, and help him to apply the principles of agriculture to California conditions. We hope the time will come when this man can obtain additional help, especially by way of agricultural credits. This latter is a most important feature, and it is encouraging to note the progress being made in this direction.

I have now given a very general view of what may be considered the most important feature of the work which we are trying to do. In addition to this, service work along the lines of the farm advisory idea is performed with a view to helping established farmers better their output, fight pests and increase their efficiency. A ramification of the work includes having accurate knowledge of all land for sale in the territory of the railroad, that inquiries may in turn be accurately answered. The proof of this work is in the result obtained. Thus far, after one year of effort in California, we are greatly encouraged. We are further encouraged to take a hopeful view in considering the successful work done by six of our agricultural men in Texas, Southwestern Kansas and New Mexico, where these men have labored for five or six years, the result showing increased efficiency on the part of the farmer and the railroad. Here in California farmers and prospective settlers have taken advantage of the service, Californians have supported it and we have some pride in pointing to a considerable evidence of concrete results. It is slow work, but this is expected, and in the end I think we will all find that the upbuilding of California in an agricultural sense is going to be most rapid by not going too fast and in building on the prosperity of the individual.

53rd Annual Oregon State Fair

Salem, September 28—October 3, 1914

\$20,000 Offered in Premiums

A generous portion for Agricultural and Horticultural Products.

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FRANK MEREDITH, Secretary, Salem, Oregon



C. E. Virden, General Manager of the California Fruit Distributors of Sacramento
Which handled eight thousand cars of fruit in 1913

California Fruit Distributors

Mr. Charles E. Virden, before Fruit Growers' Convention, Davis, California

TWENTY years ago the State of California sent out 4,293 cars of deciduous fruit, consisting of 162 cars apricots, 180 cars cherries, 1,010 cars grapes, 1,289 cars peaches, 465 cars plums, 1,187 cars pears. Last year there were shipped from this state 13,313 cars of deciduous fruit, consisting of 158 cars apricots, 231 cars cherries, 6,363 cars grapes, 2,359 cars peaches, 1,706 cars plums, 2,496 cars

pears. It is estimated that the total movement out of the state this year will be even greater than in 1913.

Twenty years ago the tonnage sent out was distributed in less than 100 markets of the country and to a very great extent the cars were distributed on a consignment basis. Prior to 1902, even with a comparatively small tonnage, the results obtained in the shipment of deciduous fruit proved very

unsatisfactory to the growers and they realized but very little for their fruit, and it was found necessary to form some sort of a distributing organization, and in 1902 the California Fruit Distributors was incorporated with the sole object of acting as a central marketing agency for the growers, packers and shippers. The capital of the corporation is nominal. No stock dividends are paid or profits undertaken. The organization maintains its general headquarters at Sacramento, and at this time consists of twelve shipping companies who operate in the state. A number of these companies are composed solely of growers. The board of directors consists of one member from each company and at this time eight of the number are actively engaged in the growing of fruit. The board of managers, consisting of six members, are selected by the board of directors. The board of directors hold monthly meetings. The board of managers meet weekly during the operating season. The business of the organization is in the hands of a general manager, subject to the direction of the board of managers and board of directors. Each and every member of the board of directors has an equal voice and an equal vote, no matter what their tonnage may be.

The operation of the California Fruit Distributors is a direct benefit to the grower and in no way is it a tax upon the grower, as the revenue necessary to maintain the organization is derived from the shipper, who makes the usual charge of seven per cent for the handling of the grower's business, which commission charge was not changed with the advent of the organization, and out of this certain percentage the California Fruit Distributors must be paid by the shipper. Such shipper pays the organization only the actual cost of operation in proportion to the tonnage that the organization handles for him. The organization has been steadily engaged in creating f.o.b. markets, and today the fruit of California is shipped into approximately 250 markets of the country, and this distribution is constantly being widened. The organization maintains selling agents in all of these markets, maintains general traveling salesmen who are assisting dealers to establish and create a demand for California fruit.

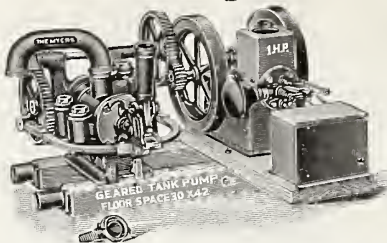
Since 1902 much has been done by this organization in bringing about much better transportation and facilities for the handling of deciduous fresh fruit shipments to the distant markets. We have succeeded in securing a more regular and dependable service. Prior to 1902 the service to Chicago was approximately ten to fifteen days. Today we are securing regular service that enables us to sell fruit in the Chicago market on the morning of the seventh day, and in New York market on the tenth day. We have better icing facilities. We have a better tracing system, so well perfected that we are in direct touch with the movement of each and

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every car, enabling us to make immediate diversions. Diversion rules are broader. Refrigeration charges have been materially reduced. Where we formerly paid as high as \$90 per car, today we have a flat rate, for example, to Chicago of \$75 for pre-iced cars from most all points. We were formerly penalized for the melting of ice during time of loading. This we succeeded in having eliminated. The freight rate to New York a few years ago was \$1.50 per hundred pounds and to Chicago \$1.25. Through our efforts we obtained a reduction to \$1.15 to practically all Eastern points. We obtained a consolidation rate which has proved of great benefit to the industry in the assembling of cars. We have obtained from the express companies a one-stop-in-transit privilege for the purpose of loading and a one-stop-in-transit privilege for the purpose of selling. We have been and are now engaged in urging upon the railroad companies the adoption of a one-stop-in-transit privilege for partial unloading. This, if granted, will enable us to develop a lot of smaller markets. We are continuously seeking the co-operation of the railroads of the country for the general betterment in the handling of the fruit tonnage.

Since the formation of the organization in 1902 the California Fruit Distributors have handled 79,320 cars of fruit, which is a little in excess of 60 per cent of the total tonnage moved during that period, and through the efforts of the organization the deciduous fruit business of California has been placed on a far more safe and stable basis than it occupied prior to 1902. Our members are at all times performing the most efficient service possible for the growers by working

for standardization, improving the pack, quality and loading facilities, etc. As soon as the cars are loaded the fruit passes under the control of the California Fruit Distributors, which acts as a neutral central selling agency, treating the fruit of all growers alike, whether they are large or small; performing the same functions for each and every one and having in mind but one thought and effort, and that to obtain the very widest distribution on a safe and sane basis, keeping every conceivable market fully supplied—not oversupplied, not undersupplied.

Potato Convention

The potato emergency convention will convene at Stockton, California, on the 8th and 9th of September. This change is made at the suggestion of the United States Department of Agriculture and will bring to us Dr. Appel, a very noted potato pathologist from Europe, and Dr. Orton and Professor Stuart, experts from the United States Department of Agriculture, none of whom could be present at the earlier dates.

The tuber moth is a damaging pest of the potato. The caterpillar not only ruins the infested tuber but may be carried in it wherever the tuber may go, and so is a menace ever and always. It is clear then that a state or region free of the pest is warranted in taking stringent measures to remain free. This necessitates action to restrain all importation of affected tubers. There are only two ways to insure this imperative necessity: Either the shipper must inspect so carefully and weed out so rigorously that no infected potatoes are shipped or else all growers in moth-free sections must declare and

enforce a strict quarantine. As we have not exercised the needed caution in making shipments, British Columbia, Idaho and Colorado, actually, and Oregon and Washington, practically, have resorted to the quarantine. Other states are likely to follow if we are not aroused to immediate and effective action. The magnitude of our potato interest is large, and the injury to our growers and shippers from this embargo is great.

Unfortunately this moth is very widely distributed throughout California, though many sections, possibly whole counties, are free of attack. This fact gains wide publicity through "Farmers' Bulletin 557" of the United States Department of Agriculture. We quote: "For many years the potato tuber moth has been the worst potato pest in California. It has now reached the State of Washington and Southern Texas and menaces adjacent states." It is also reported from Colorado and doubtfully from North Dakota. In all but California its distribution is quite limited. This, of course, works doubly to make our danger the more imminent. What adds to the gravity of the situation is the fact that the moth has been in California for years and in the other localities but a brief period, and all the other localities are large consumers of California-grown potatoes.

We see then that our only escape must come through wide and quick education of all potato growers that the moth may be held in check by all growers, Orientals as well as Americans, and that inspection be so rigid that no infested potatoes are shipped from our state. This convention is called to take steps to secure this education of all growers that they may eradicate the moth, and to arouse all to the absolute necessity of the most rigorous inspection that not a single infested tuber shall be shipped to any other state or any tuber moth-free section. There should be a large delegation present at Stockton from British Columbia and all the states contiguous to California, also from any moth-infested region of our own state.—A. J. Cook, State Commissioner of Horticulture, Sacramento, California.

The Panama Canal is going to be an important factor in the movement of the apple crop of the Northwest. Without question, when proper traffic arrangements are made, fruit can be shipped direct through the canal without transfer to many export cities at much less expense than in the past by rail to New York City and there held in cold storage, with extra charges for transferring. The Panama Canal should certainly reduce the price to European consumers and result in a large increase in the consumption of fruit in those countries.

Mr. C. M. Furry, who for many years was assistant manager of the Wenatchee Fruit Growers' Association, has accepted a position with the Northwest Fruit Exchange in the Yakima district.

The Palmer Fruit Grader and Sizer

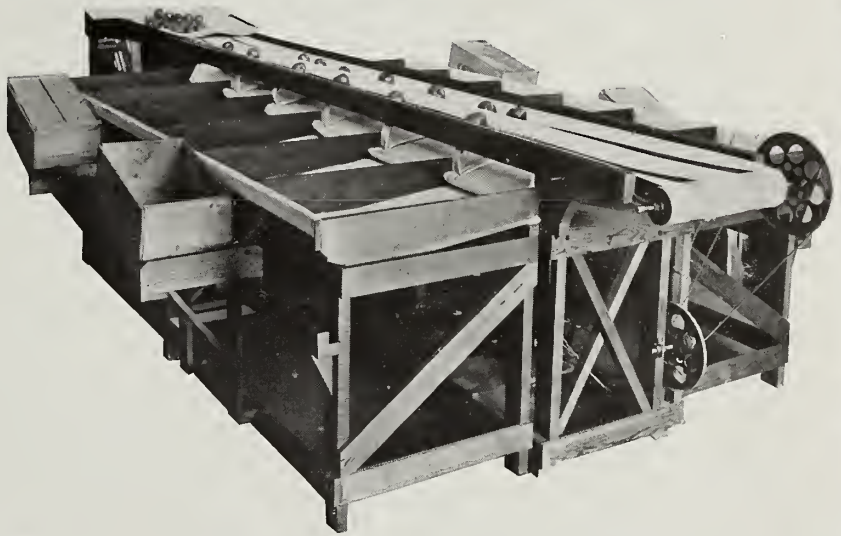
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Including packing tables, all complete, except Electric Motor,
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Makes two grades at the same time. Makes six divisions in sizes, which has been found by experienced orchardists and packers handling large crops to be absolutely the most practical number in division of sizes for efficient, rapid and economical packing.

Grades and sizes all kinds of fruit of all shapes and sizes—

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The Northwest Apple Crop.—An estimate is more or less a matter of guess this early in the season in the apple business. Very few associations or shipping concerns have called for estimates from the individual growers. Until this is done estimating is really a matter of guess on the part of those who are pretty generally informed about the quantity grown in previous years and the set this year, in a comparative way. While the editor does not assume to do any estimating he ventures to make a guess based upon the quantity shipped in previous years and the setting this year.

He makes the following guess: Wenatchee, 4,300 cars; Yakima, 5,800 cars; Eastern Washington, 500 cars; total for the State of Washington, 10,600 cars. Hood River, 1,200 cars; Rogue River, 500 cars; Willamette and Umpqua, 250 cars; Mosier, 50 cars; Eastern Oregon, 800 cars; total for the State of Oregon, 2,800 cars. Montana will ship 500 cars and Idaho 1,500, making a grand total for the Northwest of 15,400 cars.

No place in the Northwest was the setting very heavy. The shedding during the blossoming time and the June drop were extensive. Many clusters shed completely. Most of the others shed to one in a cluster. While no grower seems to have a large crop, all growers have a fair crop. This year's crop might be put down as somewhere from 65 to 75 per cent of what would be a normal, good sized yield. A splendid growing season during the remainder of the year may increase this quantity. On the other hand, a lack of favorable growing conditions may reduce the quantity. Marketing conditions will be a factor in the quantity of apples that are boxed and shipped.

It is expected this year that the grading rules will eliminate and send many apples to the vinegar factory and cider mill that were shipped in 1912. While it is reasonable to assume the crop may be somewhere near the 1912 crop, still on the other hand the grading rules may make the crop shipped considerably less than the 1912. Prices will be a large factor in determining how extensively the C grade or cooking apples will be packed.

The Compatibility of Insecticides and Fungicides.—There is no problem which is more complicated to the fruit-grower than the mixing of sprays. Naturally the fruitgrower, not being a chemist, has no knowledge of what sprays can be combined and what cannot be combined. Certain sprays cannot be combined without impairing the efficiency and without damaging the fruit or foliage. Other sprays can be combined where the efficiency is slightly reduced without damage to the fruit. In previous years the fruit-grower found out that sprays were injurious or inefficient in combination by practical experience, consequently much damage has resulted in the loss of many hundred dollars to individual orchardists. Professor G. P. Gray has given this matter very careful study and has prepared an article with a table, which appears in this issue of "Better Fruit." Chemistry has been taken into consideration as well as actual results, and therefore we believe the table and the article will present some valuable information that has never been published in any fruit journal before and therefore is entirely original. In fact nothing along this line, so far as we know, has ever been given out by anyone previous to this article by Professor Gray. Every fruit-grower who sprays, and every fruit-grower should spray, should read this article. It may prevent the loss of hundreds, even thousands of dollars.

The Grade and Pack.—Grade and pack has been a matter of development and evolution. The editor of "Better Fruit" wrote the first set of grading rules that were ever written in the Northwest, perhaps anywhere, in reference to packing apples, in the year 1904. Since then each year the Hood River Apple Growers' Union has made slight changes and improvements in these rules. Other districts began to adopt rules for grading and packing, also to improve them from year to year. This spring fruitgrowers, inspectors and men engaged in handling fruit met in Spokane in conference, and the result was the adoption of a set of rules for packing and grading. They are similar to the rules used in 1913, but improved in various ways, and will result in a better understanding of the requirements. It is hoped and believed that these rules will meet with general satisfaction. If all the marketing associations, shipping concerns and private concerns as well as the individual shippers would adopt this set of rules

it would be a step in the right direction, because it would result in one set of packing and grading rules for the entire Northwest. If this year's experience indicates an improvement in any way it is to be hoped that people interested in the fruit industry will all get together next year and improve these in such a way as to meet with the approval of every fruitgrower and shipper of the Northwest.

The Crop Estimate for 1914.—The July government report gave the estimate of apples at about ten per cent above the ten-year average. It seems at the present time that estimates are more or less indefinite and actual yields will depend largely upon growth and cleanliness and freedom from insect pests during the remainder of the season. So much has been done to improve the grade of apples that undoubtedly a large per cent will be sent to the vinegar factories and cider presses this year than ever before. This is particularly true in reference to the Northwest. Only the best grades of the Northwest will justify freight shipment East. The estimates at the present time refer generally to the quantity on the trees and include what must be eliminated as culls later in the season. The improvement in marketing organizations will do much through wider distribution to assist in marketing the crop in an intelligent way at satisfactory prices. The immense amount of advertising and publicity that has been given the apple during the last season certainly should be a factor in stimulating a greater consumption, which ought to help the marketing conditions for both the dealer and the grower.

The Raker Bill.—The latest advice reports that the Raker bill was placed on the House calendar with Congress for July 20th. This bill has received the universal support of all the apple-growing sections of the Northwest and the Pacific Coast. In fact the support is almost unanimous. There is every reason to hope at the present time that Congress, although rushed with other matters, will pass this law. It is to be hoped it will be passed because already a bill has been passed for the standardization of apples packed in barrels, and there is nothing more important at the present time for the apple growers than a law standardizing the apples packed in boxes.

Packing Apples in Small Boxes.—Many people interested in the apple industry of the Northwest have at various times discussed the advisability of packing apples in small boxes. A short, interesting article from the Northwest Fruit Exchange, appearing elsewhere in this issue, gives some interesting data on this subject well worth the attention of the growers who have had in mind the packing of apples in smaller boxes than are being used at the present time.

Prosperity Must Come Soon.—Factories, owing to the uncertainty of conditions, have laid in no supply. Jobbing and retail houses have put off purchasing until their stocks have been reduced to a minimum. In fact merchandise stocks generally throughout the country have been so depleted that frequently it is impossible to get what you want. The surplus has been consumed and there is not enough raw product or manufactured merchandise on hand to take care of the present business. Confidence apparently is returning rapidly. The banks are full of money; reserves far above required amount. The crops are large all over the entire United States. The harvesting of crops will start money in circulation and the public will have to buy on account of the depleted supply. Any good factory or any good going concern with a good financial standing and moral credit can secure all the money it needs for purchasing supplies, which will mean cash to the farmers for their products.

Setting and Dropping of Fruit

Continued from last issue

Those who do not find pruning a sufficiently drastic method of checking wood growth to augment fruitfulness may resort to the removal of a ring of bark from the trunk of the tree. In rather extensive experience on the grounds of this Station we have found ringing the bark of some use with the apple. Our practice is to remove a ring of bark from one-half to one inch wide from young apple trees at the period when the trees are making the greatest growth, usually about the middle of June. If the ringing is done earlier in the season or later in the season than June, injury is certain to result. Should it be done when the growth is being checked by drouth injury would also result. The theory upon which ringing is based is simple. Crude sap passes from the roots to the leaves through the outer layer of wood. In the leaves this crude material is acted upon by various agencies and transformed into food substances. This accumulated material passes downway through the inner bark to be distributed throughout the plant where needed. When trees are ringed the flow of sap upward through the wood continues as before the operation, but the newly made food substance cannot pass below the girdle, and therefore accumulates above and is used for the formation of fruit buds, though at the expense of other parts of the plant.

Is heredity a factor in bud formation? Can the fruit-bearing habit be passed down from one tree generation to another? Can the habit be augmented and intensified by selection? Individuals in an orchard vary as to time of coming into bearing, regularity of bearing and number of buds formed in any season. But it has not been proved that buds chosen from the trees best in these respects would produce trees that are early bearers, or more

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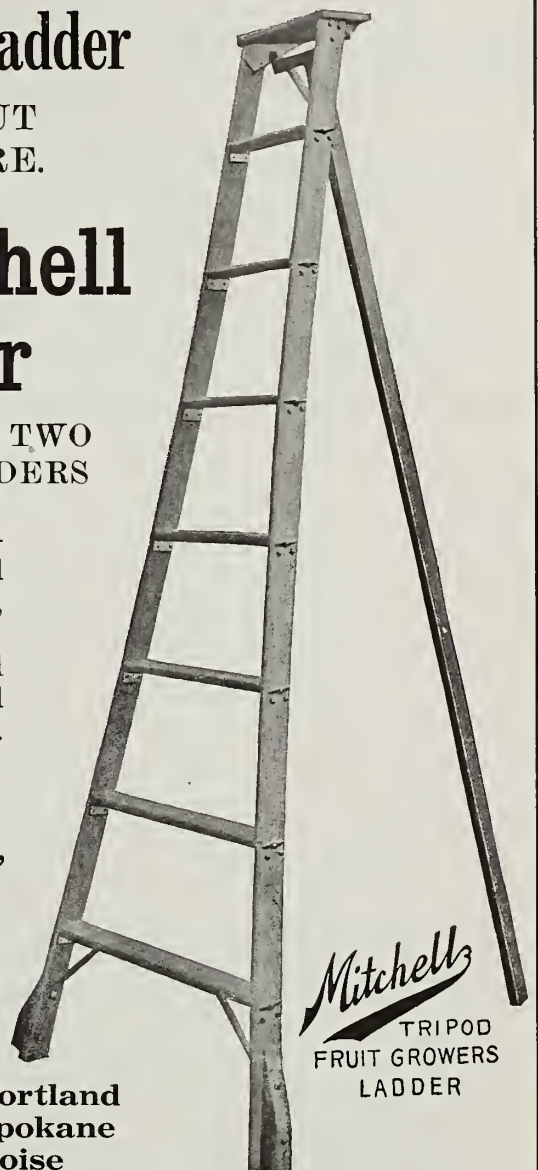
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regular in bearing or more fruitful. The present trend of science is against such a possibility. Even were it possible, there are a number of practical drawbacks. Thus, from tree generation to tree generation constitutes a period of time too long for most men to bend their efforts, especially with that clear conception of exactly what is wanted that is required in the intricate problem of plant selection. The variations at best are but slight and hundreds of trees would have to be examined to find one or two from which to start a new race. One would have to make sure, too, that the selected plants would not fall behind their fellows in other characters. The variations mentioned are almost certainly the result of environment and are not passed on from one tree generation to another, so that even were the obstacles not so great in practicing selection that few men would be able to or would take the pains to surmount them, heredity could not be counted as a factor in causing the formation of buds.

Another phase of the subject of fruit-bud control is the biennial bearing habit of some varieties of the several fruits and especially of the apple. So marked is this habit in apples that we can ascribe it as one of the characters of that fruit. A good deal of attention has been given by orchardists and experimenters to biennial bearing in apples, but as yet no one has been able greatly to change nature's way. It is maintained by some that the biennial bearing habit is due to the heavy crop, which exhausts the tree's energies, and that a light crop follows because of such exhaustion. This can be but partly true; for all can call to mind two, three or four heavy crops of some varieties, after which the trees settle down to bearing in alternate years. Nor does thinning, often proposed as a remedy for over-bearing, prove of much value. Pruning seems to alter the condition but little. We have on record several experiments in which blossoms were stripped from the trees during the bearing year to cause the setting of

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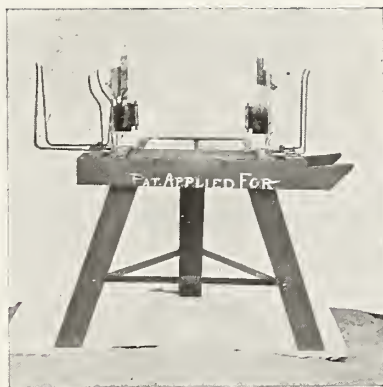
fruit during the off year. The trees so treated usually bear some fruit the off year, but seldom a satisfactory crop. Nor is the matter one of food supply. Orchards amply supplied with food are not always annual bearers. Peculiarities of the season have something to do with alternate bearing, but do not wholly account for it. Eliminating all the above conditions—admitting, however, that all have some influence on the bearing habit—we must conclude that the biennial bearing habit of apples is a peculiarity of the species. Good cultivation, an ample supply of food at all times, careful attention to pruning and training, proper control of pests and systematic thinning are all means which can be used to some extent to circumvent nature.

Leaving now the formation of fruit buds, let us see what can be done to control the development of fruit buds. Blooming, the prelude of fruiting, had little significance to the fruit grower until the discovery was made that many varieties of several fruits were unable to fertilize themselves and that failures of fruit crops were often due to the planting of infertile varieties. The knowledge obtained by experimenters in this field has to some degree modified the planting of all orchard fruits. Pollination and fertilization are events which take place in blossoms that must be reckoned with by fruit growers.

It is necessary to distinguish between pollination and fertilization, terms supposed by many to have the same mean-

ing. Pollination is the dusting of the stigma, the female organ of a flower, with pollen, the male element. Fertilization is the process in which the male cell unites with the female cell. Fertilization takes place only after pollination, but a flower may, of course, be pollinated and fertilization not take place, a fact always to be remembered. Fruits set and develop, for most part, only after fertilization. The young fruits when first formed have but a slight hold upon life. Unfavorable influences, no matter how slight, may cause them to perish. Fertilization gives the tiny fruit life, and enables it to hold upon the parent plant through nourishment drawn to supply the embryo which has been formed in the seeds. Thus fertilization usually, not always, determines whether a fruit is to develop or to drop. Shortly after blooming time we have the fruit "drop," resulting for most part from a lack of fertilization.

Fertilization, however, does not insure the complete development of fruit. Even after a perfect union of male and female cells, so far as it can be determined, much fruit drops in every orchard and without regard to whether the trees bear few or many blossoms. Crops of many varieties of several fruits do not set because of the infertility of the blossoms—that is, with many fruits pollen may be produced in abundance, seemingly perfect in appearance, and potent on the pistils of other varieties, but which may wholly fail to fertilize the ovaries of the variety from which it came. There is a great difference in the quantity of pollen produced by the varieties of the several fruits, but it is doubtful if insufficiency of pollen is a factor of much importance in the failure of trees to set fruits. Varieties that do not set fruits often have abnormal or abortive pistils or stamens. A high percentage of abnormal flowers nearly always indicates a weakness in fruit setting. Another cause of the failure to set fruits is the difference in time of maturity of stamens and pistils. When these organs do not mature at nearly the same time, fruits do not set unless pollen is supplied from some other source. The female organs of fruits are receptive, however, for several days, and the pollen is not shed at once from all anthers



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and is produced with such prodigality as in most cases to insure the pollination of late-maturing stigmas. The solution of the problem of self-sterility in the main, then, is to so plant that varieties will be cross-fertilized. It is obvious, if cross-pollination is to play an important part in fruit growing, in planting to secure it varieties must be chosen which come into blossom at the same time as those that they are expected to fertilize.

There are several causes of dropping other than lack of fertilization that need the attention of fruit growers. Weather conditions have much to do with the dropping of fruit. Prolonged cold saps the vitality of young fruits

and causes many of the more tender ones to perish and let go their hold upon the tree. Rain, whether a dashing shower or a prolonged drizzle at a low temperature, or even an extremely moist atmosphere without a fall of rain, weakens the chances of full development of fruits if such conditions prevail soon after fruit formation. Sometimes a lack of light causes fruit to drop, and thus we may explain the greater number of fruits at the tops of trees, on well-pruned trees, in open-centered trees and in orchards not thickly planted. The "June drop," especially of the peach, may be explained in part as follows: When fruits reach a certain size the food stored in the tree the

previous year is exhausted. Now if the leaves of such trees are not fully expanded and if they are not able to furnish a new supply of food, the young fruits often drop. The June drop is especially liable to take place if there be one or more of the unfavorable conditions mentioned in the previous paragraphs. With some fruits there is a tendency to drop in late summer when seeds are making great demands for food. In such cases the trees become exhausted and cast a part of their load. If at this time there be a drouth, or, on the other hand, too much rain, as is often the case, fruit not infrequently drops in considerable quantities.

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It seems worth while with trees which habitually drop their crop to try to direct the food to the fruit-bearing branches by pruning out surplus wood, cutting out water-sprouts and stimulating the growth of fruit buds the previous season. All factors which are conducive to the best nutrition of the tree influence its capacity to retain the crop. Fruits often fall because of insect or fungus injury to tree or fruit. The effects of serious injury to the foliage or the puncturing of the fruit by any one of the innumerable insect

pests are too well known to demand attention, though insect injury must by no means be thought to be a sure cause of the dropping of a crop. Some insects, as codling moth, curculio and the berry worms, may remain until the fruit is fully developed. Lastly, it may be of distinct advantage for a tree to drop a part of its load if it have more fruit than it can bring to the best maturity. If it does not do so naturally, the fruit grower should take the matter in hand and thin the crop.

The weather, as we have previously indicated, has much to do with the setting and dropping of fruit. A study of the weather as it affects the formation and development of fruit buds was made at this station several years ago, covering a period of twenty-five years beginning in 1881. Since the report of this study can no longer be had, the main conclusions are again published here. During this twenty-five-year period late frosts ruined the fruit crops in Western New York in four years, seriously lessened the yield in five years, and did much damage to pears, peaches and plums in three other seasons. That is to say, in more than half of the twenty-five years "unseasonable" frosts caused serious loss to fruit growers over the section as a whole. The years of frosts appeared in cycles, as there was but one harmful frost during the first eight years of the twenty-five, then for six years in succession the crops were damaged seriously, while during the latter half of the period the frosts were more evenly distributed. During seven years when frosts did little or no harm, cold, wet weather played almost as disastrous a part and reduced the crops to unprofitable proportions; while in five of the years of frost the damage was increased by the effects of cold storms. These storm years, like the frost years, came in cycles. A first short period of three years, beginning in 1881, was marked by storms, as was a longer period of seven years beginning in 1888. During the first period, wind strong enough to harm the blossoms, even without the accompanying rain, was a feature of each season, as was also the case in 1905; while in another year, without injurious rain storms, the wind alone did considerable harm to blossoms. Sunshine at blooming time, with warm, dry weather, marked five years only of the twenty-five; and in each of these years the crops were excellent. In three of them the records were broken for one or another of the fruits and enormous yields were secured from practically all fruits. From these facts, and more detailed data given in the original bulletin, we must conclude that rain and the cold and wind that usually accompany it in mid-May cause the loss of more fruit than any other agency. Killing frosts take second place as destructive forces, though the sudden, plainly evident harm they do attracts more attention and causes more complaint than the slowly developing, more concealed damage from a long, cold storm without freezing temperature.



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Frosts usually blacken and destroy immediately the reproductive organs of the flowers, giving very plain evidence of harm; but such evidence is often given undue weight, so that the injury from light frosts is frequently overestimated. Cold storms, or even very cool days without frost, at blooming time lessen or destroy the crop in several ways. The rains wash off the tiny grains of pollen from the delicate anthers of the flowers and thus prevent their journey on the body of some insect, so that they fail to perform their fertilizing office. Even if a pollen grain chance to reach the pistil it may fail to adhere and grow, since the rain also washes off and dilutes the adhesive, stimulating secretion upon the stigmas. Provided neither of these causes prevents the journey and proper placing of the pollen, the cold of such storms often so lessens the vitality of the grains that they germinate very slow or not at all. The cold and the rain also check the activities of bees and other insects, and as these are the effective carriers of pollen grains, the possibility of successful pollination is still further lessened. Dampness is favorable to the growth of most fungi—which cause our leading leaf and fruit diseases—and such fungi frequently attack and ruin flowers during the May storms. Winds alone do comparatively slight harm to fruits early in the season, but occasionally are strong enough to whip blossoms from the trees and to prevent the flight or active work of insects. If they are drying and long continued they may evaporate the secretion from the stigmas and thereby prevent the retention and germination of the pollen; while cold, dry winds at blooming time chill vegetation and retard all plant activities. On the other hand, light breezes on nights when frosts would otherwise occur may sweep away the settling chill and prevent damage; or, in favorable localities beside large bodies of water, may bring in clouds or fogs to check heat radiation and prevent freezing.

Unfortunately, at least in a narrow sense, man cannot control the weather to any great extent. Orchard heaters are now used to warm the temperature of an orchard and prevent frosts. By small fires, especially of damp, smouldering, smoke-producing materials, orchards and vineyards may occasionally be protected from light frosts. By the proper placing of windbreaks—not so

simple a matter as it may at first appear—some advantage may be given tender fruits. By whitewashing the trees in early spring blossoming may be retarded a few days. A definite amount of heat is necessary to bring buds to maturity, and since white objects absorb less heat than dark ones, such whitening of the trees may occasionally carry the buds unopened safely through a frost that would destroy the flowers. Aside from these comparatively unimportant exceptions, we can do nothing, after the orchard is established, to protect fruit trees from weather stresses. But we can do much to protect future fruit crops by careful study, before we locate the plantation, of weather conditions and crop adaptations. It would be most unwise to set apricots, plums and peaches, which are relatively tender at blossoming, in any locality where the average date for the last killing frost is as late as May 10; yet some late-blooming or cold-resistant varieties of even these fruits, on some hillside rightly located or beside a favoring lake, might escape frosts often enough to make their culture highly profitable, since they could be sold in near markets never glutted with such fruits because of general unfavorable conditions.

In choosing a location for an orchard we must consider latitude, altitude, and general topographic conditions, especially proximity to large bodies of water, since these all affect general climatic conditions. Perhaps fully as important as general location, however, is the choice of a particular field on which to plant fruit trees or grape vines. Omitting all discussion of soil, markets, roads and other surroundings, the lay of the land may frequently determine its value for an orchard or vineyard. Every fruit plantation has a local climate varying in the different parts of the tract in accordance with the lay of the land. Low-lying spots show the greatest extremes—lowest temperature in cold weather and highest temperature in hot weather. Conversely, on the elevated portions of a tract the temperature is most equable—less cold in low temperatures, less hot in high temperatures. The direction of the slope of the ground causes variation in the temperature probably because of the greater amount of heat absorbed from the sun by southerly slopes and because of the different exposures to prevailing winds. A slope also gives better air drainage than a level. The difference between high land and valley, slope and plain, is often amply sufficient to account for the idiosyncrasies in frost injuries so often noted. Some fruit growers claim to obtain a certain degree of immunity from frost through good air drainage secured by planting at a sufficient distance so that tops do not touch and by keeping the heads within bounds by pruning.

Quite as essential as location in doing the little that can be done to avert frost injury is the selection of varieties. Some varieties of each of the several fruits blossom later than others, and

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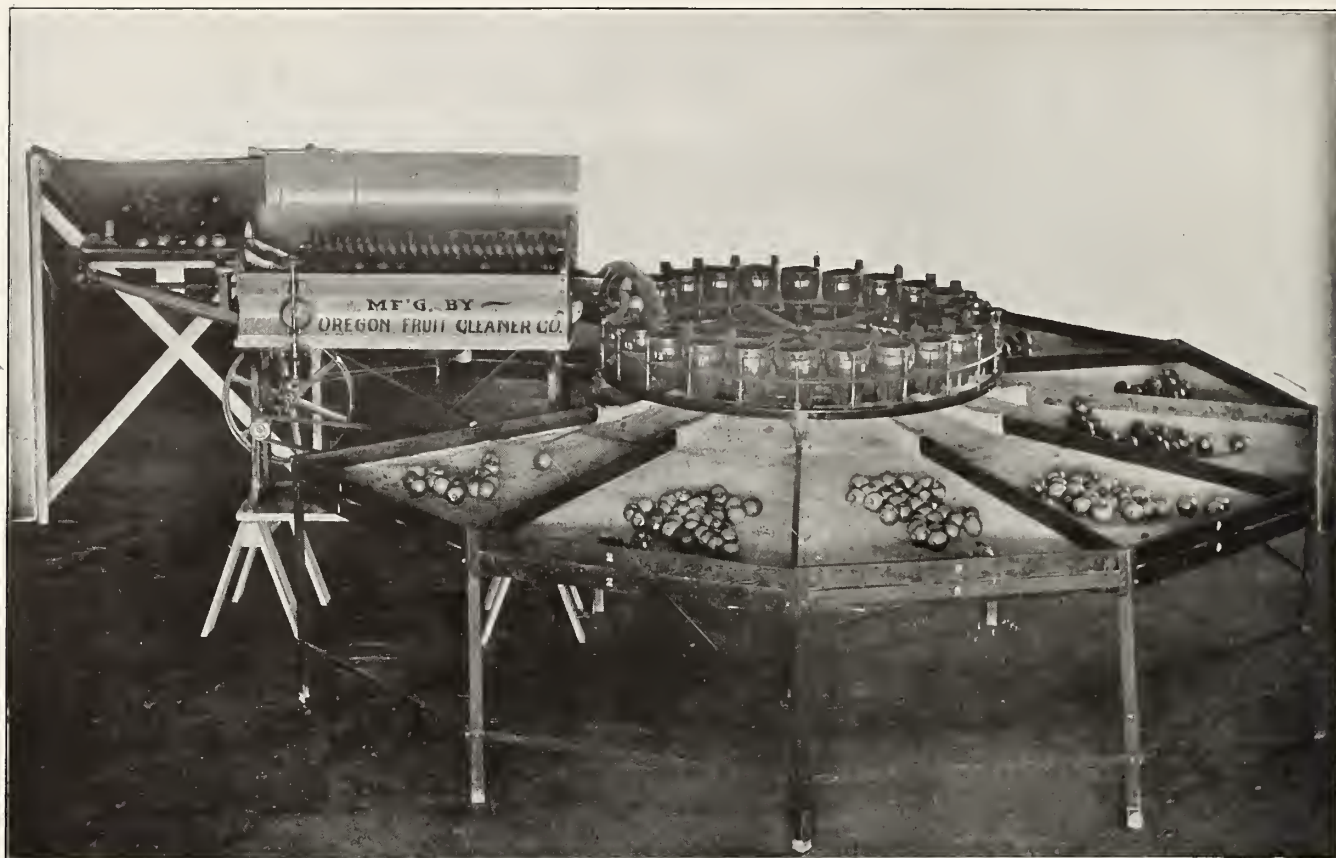


these are usually in least danger from frosts. The length of time during which different varieties are in blossom is worth considering, though it varies considerably in accordance with the fruit, the variety, and, most of all, the weather. The average length of the period of bloom for the different species of fruits is: For apples, about nine days; for pears, seven days; for peaches, eight days; for plums, seven days; for cherries, seven days, and for grapes, ten days. The time from first blossoms until all have dropped may vary greatly, as the blossoms of some fruits do not last longer than forty-eight hours in very hot, dry weather. Blossoms of tree fruits, after opening, do not close night or day, though pollination probably takes place during the day only. Other things being equal, of course it would be in the fruit grower's favor, in a locality where late frosts are liable to occur, to select late-blooming varieties. Such varieties cannot be selected by knowing only their time of ripening, for some early fall apples blossom late, like Williams, and some late winter apples blossom early, like

King and Wagener. That is, there is no correlation between the time of blooming and the time of ripening of fruits. Early varieties do not necessarily, though some may, blossom earlier than late varieties. It is not possible, therefore, by a selection of late varieties to escape danger from late frosts.

Commission houses in Sweden have heretofore purchased their apples from Oregon and Washington through German and English importers. They are now seeking arrangements to secure shipments direct, believing that the same can be secured in this way, and making a considerable saving, which will enable the Swedish commission merchants to sell a much larger quantity than heretofore.

The policy of the Canadian Government with reference to fruit inspection this year will be very strict. Consequently it is up to the shippers to see that fruit is free from all diseases or pests, thereby saving themselves extra trouble and unnecessary expense.



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The Oak Fungus of Fruit Trees

By Professor W. T. Horne, University of California

THE oak fungus disease or fungous root rot, caused by the fungus *Armillaria mollea*, is a very common and serious disease of orchard trees in California. Its most striking characteristics are its marked localization and slow progress. The fungus which causes it probably existed in the roots of wild trees, attacking living roots, but working so slowly that vigorous trees were not killed, and also persisting in the dead wood, causing the roots to decay. It appears that many wild trees are infected in nature, and I do not have sufficient evidence to say that oaks are more subject to infection naturally than other trees. Not all roots in the soil are infected, so that we cannot say that because an oak tree grew in a given place oak fungus will appear there. When the roots of a fruit tree come sufficiently near to infected wood in the soil the fungus grows over and attacks the living roots. We must believe that this may happen long after the original clearing, because the fungus will not die out of the soil until the root in which it lives is completely decayed. It is probable that new infections have appeared ten years after planting an orchard.

The course of the disease is now well understood by fruitgrowers. Often several trees have died before particu-

lar attention is given to the trouble. It is then found that two or three trees nearest to those which have died are dying or diseased. The trouble can be recognized with certainty only by an examination of the roots. Usually two or three years will elapse after the first signs of weakening have appeared before the tree dies, and after the first collapse some part of the tree may start up and continue to grow for an indefinite time, finally to be blown over by the wind or to die completely if it does not first exhaust the grower's patience and get pulled out. Two or three or more years may pass before the disease spreads to the next tree. It is thus seen that the rate of spread is slow, but we have maps of spots in citrus orchards fifteen years old where 25 to 30 trees have been lost. In some cases practically whole orchards have been swept over. Some have not been replanted. Others have been replanted, part of the replants living and others dying, so that the result is very discouraging. After the disease has become well established occasional new centers of infection appear. It is believed that probably such new infections arise from a diseased root being carried along and, before it dies, plowed under near a healthy root. I have picked up from the moist cover crop a piece of dis-

eased root which had fallen from the cart in which a dead tree was being hauled from the orchard. If this root had been plowed under so as to come near a healthy root the fungus would almost certainly have grown over into the healthy root and in a few years another tree would have died and a new center of infection would have been established.

Toadstools or mushrooms appear during early winter about most of the sick and dead trees. These toadstools may continue to come up on some stumps for at least five years. They are light-tan color and are found in large clumps. They arise directly from the diseased roots and are the fruiting bodies of the fungus. White spores are found on them in immense numbers, but probably these spores do not cause new infections in living trees, although we have repeatedly grown them artificially. They might easily infect a decaying stump.

If we examine carefully a root newly killed by this fungus we see that its bark is somewhat puffed and when cut into is soft and moist. By care we can separate it into layers, exposing white plaques of fungus which are soft felty and tend to radiate out in fan-shaped bodies. The appearance will vary somewhat according to the kind

of tree. The odor is a sharp, sweet mushroom odor and not putrid or sour. Precisely such bodies are found in artificial cultures. Sometimes the bark is cracked and fungus bodies pushed out into prominent ridges, which are black on the surface but white below. Roots which have been attacked for some time will be found to have the wood with a white decay working in from the surface. After a time the wood becomes very soft and moist and finally almost completely disappears.

Dark brown to black shining root-like structures coming out of the diseased bark and running along its surface are often found. These are the rhizomorphs; they resemble roots but have a different structure, the center being composed of soft white fibers. They give the fungus the power to go several inches from one root to another. When the tip of the rhizomorph comes to a healthy root the very small microscopic threads of which it is composed seem to loosen like the cut end of a rope and the individual threads penetrate into the bark and start a new infection.

It is often recommended to take great pains to get out all roots from new land before planting. Evidently the fewer roots left in the soil the less chance there will be of infection. However, it is not within the limits of practicability to get out all roots from wooded land. A good practice would be to clear the land, cultivate thoroughly, then keep it several years in alfalfa before planting the orchard. However, in view of the scattered nature of infections and the impatience of planters, it does not seem worth while to insist on such a program. Treatment of individual trees may have a certain value, but usually will be disappointing and it is doubtful if it is worth while for orchard trees. If the crown of an affected tree is uncovered and by a generous amount of digging all diseased roots are removed or the diseased bark scraped off and the wood treated, as recommended in my paper on wood decays, and the place allowed to dry out well, the remaining roots will grow freely, provided the tree has not been girdled by the fungus. By repeating such treatment and by keeping the crown as dry as practicable it is entirely possible that a tree may be kept alive for many years.

We have insisted that two problems are involved: First, checking the outward advance of the fungus so that new trees will not become affected and, second, treatment of area already infected. Treating the margin of the spot has been practiced, I understand, in German forests by digging a ditch about the affected area so as to enclose all the fungus. The fungus travels along the roots and a ditch makes a space which it has no way to pass. We have some experiments under way to test this method. Our orchardists object to an open ditch so we allowed the ditches to be refilled. One spot ditched was in an orange orchard in good mellow soil, trees good and more than ten

years old. There were two dead trees and two infected at the root, but with the tops still fine. The ditch was made three to three and one-half feet deep, no wider than necessary for digging. It seemed to have cut all the roots. Infected roots could be readily recognized. As finished it was believed that no diseased orange roots crossed outside the ditch. A layer of tarred building paper of good quality was put against one side of the ditch to prevent new roots from crossing back into the diseased area. After a little more than two years the ditch was reopened. The building paper was worthless for stopping the roots, as they grew through it very readily. The rest of the experiment was highly encouraging. In repeated cases a root from which a piece had been cut out could be recognized unmistakably on the two sides of the ditch. The piece within the diseased area would be in an advanced condition of decay with the fungus, while the end toward the unaffected tree and outside the diseased area would be entirely unattacked and putting out numerous new roots. There is no doubt that if the ditch had not been made the fungus would surely have followed the root and there would have been no hope of saving the tree. Around this area, which included four diseased trees, no less than five good trees were saved from infection. If once opening the ditch will save the sound trees from infection for two years there is no reason why the thing cannot be done again in the same place and the spot permanently restrained to its present area. Several points in the work should be noted. In one case, unintentionally, a diseased piece of root was thrown back into the ditch. The new roots which had grown out from the healthy side had come in contact with this and were already diseased, but this infection had not gone far back toward the good tree. I believe we succeeded in removing all of this infection. It should be pointed out that many new roots were getting close to the infected areas and would soon have become infected, so that if the ditch is made once and not reopened the trouble will be only slightly delayed and the work will hardly be worth while. Some orange roots which were cut off in working the ditch remained alive in the soil for more than two years and were pushing out growth from the cut end, which might have become a leafy shoot. This is an important matter because it shows that a long time must elapse before roots will be entirely decayed in the soil.

Treating the Diseased Area.—It would not seem to be a difficult matter to find some substance which could be put into the soil and entirely kill everything. Carbon bisulfid is the most promising material thus far suggested. If used properly and in sufficient quantity I feel sure it will do the work. It is simply a matter of studying out the method and counting the cost. I feel rather doubtful if it will be possible to kill the fungus and not kill good roots lying in the soil, because the fungus

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penetrates into the wood and part of it is deeply buried, while the living part of roots is the cambium layer just between the bark and wood. The way carbon bisulfid spreads and works in the soil may be illustrated by one experiment. A row of holes were bored with a small soil auger one foot apart and about fourteen inches deep. One ounce of carbon bisulfid was poured into each hole and it was filled and tamped with the heel at once. This row of holes passed just at the edge of the branches of a good orange tree. After a little more than two months part of this row of holes was dug out. Roots near the surface of the ground were found dead a little more than a foot on each side of the holes, while the deepest roots (less than three feet) were killed nearly three feet from the holes. There was no way to guess how deeply the material was effective, but evidently it would be for a good way. Wetting or covering the soil after injecting the carbon bisulfid will probably be more important than the amount used. We have taken a treatment of injecting one and one-half ounces at one and one-half feet each way as a sort of standard for experimental purposes. I am convinced that the treatment is worthless if the material is injected into dry, loose soil. I do not yet have a precise method worked out which can be depended on, but there is much hope of getting such a treatment in the future.

Ways of utilizing the infected areas are by planting annual crops or resistant trees if they can be found. Such areas have sometimes been used by well-meaning growers for nurseries. The nursery would probably grow very well so far as could be observed, but it will be clear that such planting is highly undesirable. I have found spring replants badly infected the following fall. Of resistant trees the pear is decidedly the favorite in California and I have no definite data to oppose to this view. However, I understand that the pear is not entirely immune in the states north of us nor east of the Rocky Mountains. Black walnut, cherry, apple and fig probably all possess decided resistance. I can only advise caution in replanting diseased areas with supposedly resistant trees. The strain of heavy fruit bearing and occasional bad seasons may reduce resistance in some cases. I would urge at least that a large hole should be dug and the soil not used to fill the hole, but spread out to dry around it and all roots gathered up. The best quality of soil, free from pieces of sticks or wood, should be used to fill the hole in which to plant the trees. The fine roots, I believe, are less liable to infection than the larger ones, so that in this way resistant roots will be given the best chance to escape infection.

I cannot close this article without calling to your attention that here has been suggested, on the basis of experimentation, one definite way, the ditch method, for stopping the spread of oak fungus disease. The work suggested

is not unduly difficult nor expensive and should be practicable under some conditions. We hope in the next few years to be able to suggest treatments more adaptable for large trees, such as walnuts. In starting in to treat an oak fungus area, first make sure that the oak fungus is present and that you can recognize it on the roots. A piece of suspected root may be sent to the university if there is any uncertainty. Next, make a map of the area and locate every tree which has the disease and indicate these on the map. Condition of the trees should also be indicated. Then the map can be studied and it can be decided exactly what should be done. I advise deliberation. The problem is one which may take years to solve, but if worked at consistently I believe may be solved in time and without extraordinary expense.

[Editor's Note.—The article referred to in this paper on "The Importance and Prevention of Wood Decay in Fruit Trees" will appear in September issue of "Better Fruit." Oak fungus, in the Northwest and some other sections, is known as mushroom fungus.]

Arsenite of Zinc vs. Arsenate of Lead

Arsenite of zinc has frequently been used as a substitute for arsenate of lead in spraying for the codling moth because it is cheaper to use, being a stronger-acting poison and said to be as effective as arsenate of lead.

Some fruitgrowers report injury to the foliage, while others report no injury and good success. The same contradictory results from the use of this insecticide have been secured by agricultural experiment stations and suggest that this poison as manufactured is not a stable or uniform product. The occasional injury to foliage from the use of arsenite of zinc may also be due to soluble arsenic being formed when it comes in contact with the carbonated waters always present on leaves of trees after rains and dews. At any rate arsenite of zinc is not as safe to use as arsenate of lead for spraying for the codling moth, and when used should be combined with bordeaux or lime to prevent burning of the foliage. It should never be combined with soap or lime-sulphur.

Arsenite of zinc can be recommended for leaf-feeding insects on shade trees and for potato beetles and cabbage worms, as it has better adhesive qualities than paris green and will not injure the foliage of potatoes and cabbage.—T. H. Parks, Field Entomologist, Idaho Experiment Station, Boise.

The Hayes Fruit Company of North Yakima is endeavoring to secure a suitable warehouse at Zillah to handle this year's crop in that district.

Wanted Position as manager or foreman on fruit ranch; 27 years' experience hard and soft fruits and cob nuts. Used to handling labor. Six years manager of fruit orchard and teaching practical fruit growing, pruning, grafting, etc., at high class college. Excellent references. Aged 40. Address J. G., care "Better Fruit."

Fairs, Apple Shows and Conventions

The Spokane Interstate Fair will be held in Spokane, September 12th to 14th, 1914. This is one of the large fairs of the Inland Empire. The program this year is exceedingly attractive, with a splendid list of premiums in addition to the large cash premiums. This is a fair that every farmer and fruitgrower of the Northwest should be interested in. The program this year is very attractive.

* * *

The Pacific Coast nurserymen held their twelfth annual meeting at Vancouver, B. C., June 16-18. The meeting was extremely interesting and valuable to all engaged in the nursery business. Many subjects in the nursery business were discussed. Some of the principal subjects were: "The Inspection Laws, Bonding System for Nurserymen, How to Encourage a Greater Use of Ornamentals, Maintaining the Fertility of Nursery Land; the Pruning Questions Concerning Both Nurserymen and Fruitgrowers, Market Problems in Relation to the Nursery Business, and the Panama Pacific Exposition in Relation to the Nursery interests."

* * *

The Fair Hesperades.—Wenatchee is one of the most thrifty and enterprising cities in the Northwest. In a few years it has grown from a village to a beautiful little city. Wenatchee apples have become known throughout the world through their quality and through the enterprise of the progressive fruitgrowers. This city is the shipping point for a very large territory lying along the Columbia River; the fruit from up-river points is brought down on boats and shipped out by rail. The Fair Hesperades is held for the purpose of exploiting the products of North-Central Washington. The first show was held last year and met with wonderful success, with a very large attendance. This year the show will be greater than last year and far more attractive in every way. The Fair Hesperades is a show which is worth any man's time and money to attend.

* * *

Every year the City of Salem, Oregon, holds an Annual Cherry Show. This year the show was a greater success than ever before, with a very large attendance. The displays were magnificent and very attractive. The cherry growers deserve great credit for their very attractive exhibits, including all the principal varieties that are grown in Oregon. Among the principal varieties of commercial importance to the Northwest are the Royal Anns, Bings, Lamberts and Black Republicans, which made up the greater part of the exhibit. It is justly befitting that Salem should hold this show, as the Bing and Lambert, which are the two best eating cherries in the world, the largest and the best for commercial purposes, originated in the Willamette

Valley, the Lambert being named after one of our pioneer fruitgrowers and the Bing being named after a Chinaman named Bing, who had served his master for many years. These are the two largest cherries grown anywhere in the world and the two best shippers. The Willamette Valley is the natural home of the cherry, as the trees thrive and bear heavily. Cherries are a good paying crop. The Royal Ann always brings good money because it sells readily to the cannery at a good profit. Even when the fresh-fruit market is glutted the cannery will take all they can get of Royal Anns.

* * *

The Associated Advertising Club of America held one of the most interesting conventions ever held at Toronto, Ontario, June 21st to 25th. The meeting was largely attended and many very able and interesting addresses were delivered. The object and aim of the club is to show the advertiser how and when to advertise, to make advertising clean and to produce better results. Advertising is becoming a scientific business, so to speak. It is very evident from the list of addresses that the object of the association is to improve advertising in every way possible; to educate the advertiser how to prepare copy to bring the greatest results; to create more confidence in advertising by eliminating all objectionable advertising; to protect the purchaser by eliminating fake advertisers; to protect the advertiser by urging definite circulation statements from all publications, so the advertiser will know just what he is paying for—all of which will result in raising the standard of publications.

* * *

The International Apple Shippers' Association will hold its Twentieth Annual Convention at Boston, Massachusetts, August 5th to 7th inclusive, at the Copley-Plaza Hotel. The meetings of this association are extremely interesting, as the editor of "Better Fruit" knows, having had the pleasure of visiting one in 1910 at Niagara Falls, at which meeting he made an address. There are over 500 members in this association. They get together for the purpose of discussing the apple situation for the coming year and exchanging views and giving each other the benefit of their own experiences in increasing the trade. Mr. R. G. Phillips is secretary of the association, with an office at 612 Mercantile Building, Rochester, New York. He secures estimates from every section of the country so the apple dealers will know what the size of the crop is going to be for the coming year. Fruitgrowers who are able to get away to attend this meeting should certainly do so, because they will find it very instructive and interesting. From the dealers they will learn much about the trials and tribulations of marketing the apple crop. If every grower could meet a large number of the dealers and discuss the marketing business with them it would certainly result in the growers being

Invigorate Your Orchards

Better size, color and flavor assured. Acts quickly upon growing fruit. Positively removes all cherry gumosis. Will apply for 5 cents for four-year-olds, others 10 cents.

Write me quick.

W. D. MOREHOUSE
The Dalles, Oregon

H. HARRIS & CO. Fruit Auctioneers

227 State Street
Boston, Massachusetts

Established 1847

Frank Moseley
Frank L. Ripley
Cutler B. Downer

better able to understand what the consuming public wants in the way of apples, when they want them and how they should be put up.

History of the North Pacific Fruit Distributors

Incorporated at Spokane, Wash., December 17, 1912.

Organized temporarily at North Yakima, Wash., March 21, 1913, and organized finally at Hood River, Ore., May 13, 1913.

Opened permanent offices at Spokane, Wash., June 10, 1913.

Affiliated with by eight sub-central (fruit) organizations, with a total of 98 locals, one more sub-central being in prospect and another contemplated.

Shipped first carload July 8, 1913. Made total shipment of 5,083 cars during season.

Sold eighty-three per cent of fruit on f.o.b. basis.

Received total price of \$3,069,935.51.

Operated at a total selling cost, including cost of maintaining central office, of brokerage and exchange, expense of legal, claim and traffic department, expense of extension and organization, of only a fraction over five per cent of the net returns to the central and approximately only four per cent of the gross returns to the central.

Realized average price per box for apples, all varieties, all districts, all grades and all sizes of \$1.26 f.o.b. shipping point.

Returned final settlement money to sub-centrals on 2,000 cars in average time of 26 days.

Distributed fruit to 243 cities in 38 states in the United States, 33 cities in six Canadian provinces and 16 cities in ten European countries and to South America, South Africa, Australia and the Philippines.

Why 7,000* Growers

CO-OPERATE THROUGH THE

North Pacific Fruit Distributors

Seventeen Reasons

1. It places at the service of the grower a body of trained and experienced experts, better equipped and better informed than the buyers; it maintains a comprehensive and trustworthy system of gathering crop estimates and daily market reports, at a cost of many thousand dollars, to adequately serve the grower; it thus puts the grower in an advantageous position in his relationship to the trade.
2. It distributes the grower's fruit, by intelligent organization, to all of the markets, so as to neither over-supply nor under-supply any particular markets, and provides an agency large enough to seek and find new markets, as well as develop old ones.
3. It markets the grower's fruit in an extensive but conservative and economical manner and without ruinous competition.
4. It furnishes the grower with personal representatives in every important market center in America and Europe, and, in fact, the world, whose first consideration is the grower's interests,—who examine the fruit in transit, repair damages, and, where necessary, protect the grower against improper demands for allowances, etc.
5. It secures a uniform and dependable grade and pack of the fruit throughout every district,—a thing of great value to the trade and therefore to the grower seeking the trade,—and it is thereby enabled to back the brand of each district with a guarantee that will bring a higher price for the fruit than for other fruit outside of such brand.
6. It properly and scientifically advertises the grower's fruit, and returns the full value of that advertising to the grower.
7. It gives the grower the power, backed by the exclusive service of skilled legal, traffic and claim departments, to secure justice and fair dealing in all instances from buyers, railroads, etc.
8. It removes from the methods and practices of the fruit business the objectionable and obstructive features, the strength and influence of 6,000 united growers being vastly more effective than that of 6,000 individual, disinterested units.
9. It gives the grower control of his own product from orchard to market, thus enabling him to secure the handling of his fruit by the legitimate trade at an equitable cost.
10. It can, by reason of its all-district representation, supply any quantity of any variety of any fruit to meet the most exacting and peremptory demands of the trade and thus avail the grower of the benefits to be derived from such special service.
11. It determines the price at which the grower's fruit is to be sold, just as every other substantial producing business considers cost, adds a reasonable profit, and thus determines the selling price.
12. It insures a fair price to the grower throughout the season because of its equitable pooling system (each district's fruit being pooled by itself however) and because of certain definite marketing policies.
13. It eliminates, by reason of its magnitude, waste in marketing the grower's fruit, and so reduces the price to the consumer, proportionately increasing the consumption of that fruit.
14. It helps to finance the grower at lower rates of interest through loans from the banks, rather than an advance from some one buyer, thus liberating the fruit to all buyers and all markets, instead of one buyer and one market, as is the case when the grower accepts an advance from a buyer.
15. It builds a permanent selling machine for the grower, in contrast to a one-man selling organization, efficient only while the man of strong capacity at its head lives and retains his position,—big enough to handle tonnage ten times as great as in 1912, when every known marketing agency failed, and one that will always be on the job.
16. It investigates and aids in matters of vital importance to the grower, such as national and state legislation, Panama Canal shipping facilities, freight rates, provisions for refrigeration, storage, warehouses, supplies, etc.
17. It puts the grower in business for himself on a business basis.

These are only seventeen reasons—there are more

ARE YOU ONE OF THE 7,000

North Pacific Fruit Distributors

MAIN OFFICE: SPOKANE, WASHINGTON

*Since the publication of this advertisement last month the affiliated membership has increased from 6,000 to 7,000.

Grade Rules, Etc.

Continued from page 11

labeled as Fancy. This grade shall include the following varieties: Apple of Commerce, Ben Hur, Bismarck, Canada Red, Chicago, Champion, Delaware Red, Fall Wine, Golden Russet, Hoover, Ingram, Kentish, Kinnard, Mann, McMahon, Mother, Northwestern Greening, Palouse, Pewaukee, Pryor Red, Rambo, Rhode Island Greening, Roxbury Russet, Russian Red, Salome, Shackelford, Senator, Stark, Steel Red, Swaar, Wallbridge, Westfield, Willow Twig, Yellow Bellefleur and other varieties not included in these grading rules.

All boxes to be lined and cardboard to be used top and bottom, but no cardboard to be used between layers in sizes smaller than 88s. No apples will be accepted in boxes showing infection of worms or cocoons. All apples to be wrapped.

Exceptions—Summer varieties, such as Astrachan, Baileys Sweet, Bietzheimer, Duchess, Early Harvest, Red June, Strawberry, Twenty Ounce Pippin, Yellow Transparent and kindred

St. Helens Hall

PORTLAND, OREGON

Resident and Day School for Girls

In charge of Sisters of St. John Baptist (Episcopal) Collegiate. Academic and Elementary Departments, Music, Art, Elocution, Domestic Art, Domestic Science, Gymnasium. For catalog address—

THE SISTER SUPERIOR, St. Helens Hall

Bishop Scott School for Boys

Yamhill, Oregon

Under auspices Episcopal Diocese of Oregon. Fall term starts September 23, 1914. Grammar school and college preparatory courses. Competent instruction in all branches. Send for booklet "Where Boys are Trained to Think." Address Bishop Scott School, Yamhill, Oregon

THE LIFE CAREER

"Schooling in youth should invariably be directed to prepare a person in the best way for the best permanent occupation for which he is capable."—President C. W. Eliot.

This is the Mission of the
OREGON AGRICULTURAL COLLEGE

Forty-sixth School Year Opens
SEPTEMBER 18th, 1914

Write for illustrated 100-page Booklet, "THE LIFE CAREER," and for Catalog containing full information.

Degree Courses—AGRICULTURE: Agronomy, Animal Husbandry, Dairy Husbandry, Poultry Husbandry, Horticulture, Agriculture for Teachers. FORESTRY: LOGGING ENGINEERING. HOME ECONOMICS: Domestic Science, Domestic Art, ENGINEERING: Electrical, Irrigation, Highway, Mechanical, Chemical, Mining, Ceramics. COMMERCE. PHARMACY. INDUSTRIAL ARTS.

Vocational Courses—Agriculture, Dairying, Home Makers' Course, Industrial Arts, Forestry, Business Short Course.

School of Music—Piano, String, Band, Voice Culture.

Farmers Business Course by Mail Free

Address THE REGISTRAR,

(tw-7-15 to 9-9) Corvallis, Oregon

WHEN WRITING ADVERTISERS MENTION BETTER FRUIT





The Home Maker



Get Your Canadian Home from the Canadian Pacific



BUY an irrigated farm where you have insurance against drought and where you have just the moisture you need when you need it. You know the value of controlling the watering of your crops. In sunny Southern Alberta you are master of the moisture. The Canadian Pacific's great Irrigation Works insure your yield whenever rainfall is insufficient. Irrigation is not always a necessity—but it is yours at command. It means dependable crops, and wonderful crops every year. The Eastern section of the Canadian Pacific Irrigation Block East of Calgary is now open. Virgin soil of famous fertility—alfalfa, timothy and other fodders—raises all the grain and root crops, fine climate—great cattle country—good markets—unexcelled transportation.

We want the alert enterprising farmers who see this magnificent opportunity. So we make the most liberal terms. Take 20 years to pay. Call on us for long time loan of \$2000 for farm improvements if you want it. Investigate now. This block will soon be the most densely populated and intensely cultivated district in the west.

You Can Have 20 Years to Pay

We will sell you this rich, irrigated, Canadian land for \$35 to \$75 an acre. You need pay only one-twentieth down. Think of it—only one-twentieth down, and then the balance in 19 equal annual payments. Long before your final payment comes due, your farm will have paid for itself over and over again. Many good farmers in Western Canada have paid for their farms with one crop. Here are some of the startling features of the most remarkable land offer you have ever read:

We Lend You \$2,000 for Farm Improvements This offer of a loan up to \$2,000 is for farm development only, with no other security than the land itself, and shows our confidence in the fertility of the soil and in your ability to make it produce prosperity for you and traffic for our lines. This loan will help you in providing buildings, fencing, sinking well and breaking, and you are given twenty years in which to fully repay this loan. While enjoying the use of this money, you pay interest at only 6%.

Advance Live Stock on Loan Basis The Company, in case of the approved land purchaser who is in a position and has the ability to take care of his stock, will advance cattle, sheep and hogs up to the value of \$1,000 on the basis of the settler's note with interest at eight per cent, to enable him to develop more rapidly, on the right basis of mixed farming.

Farm Made Ready by Experts if Desired If you want a place all ready established, select one which our Department of Agricultural Experts has developed. On our improved farms, house and other buildings are up, well is dug, farm fenced, fields cultivated and in crop. All waiting for those who want an immediate start and quick results—all planned and completed by men who know—our own agricultural experts. Take twenty years to pay if you want to. We give free service—expert service—the valuable assistance of great demonstration farms, in charge of agricultural specialists employed by the Canadian Pacific for its own farms. This service is yours—free.

Water Rental Will Not Exceed \$1.25 per Acre Each water agreement will have approval of Dominion Government. Lands are located on or near established lines of railway. First payment of irrigated land is 1-20th of purchase price. At end of first year no payment is due on principal or water rental, only payment of interest is required. At end of second year, no payment of principal is required, but purchaser will be required to pay interest and water rental. At end of third year, the second payment of principal, interest and water rental will be required.

Here is where your opportunity lies. Don't delay. Mail coupon here at once. Best land will be taken first—time is precious to you. Write today.

W. T. THORNTON, Colonization Agent
Canadian Pacific Railway
Colonization Department
112 West Adams St., Chicago, Illinois.




W. T. THORNTON, Colonization Agent,
Canadian Pacific Railway, Colonization
Department, 112 W. Adams St., Chicago
Please send me your book of information on
Irrigation Farming in Sunny Alberta.

Name

Address

Town

State

varieties not otherwise specified in these grading rules, together with early fall varieties, such as Alexander, Blue Pearmain, Wolf River, Spokane Beauty, Fall Pippin, Waxen, Talman Sweet, Sweet Bough and other varieties not provided for in these grading rules, as grown in sections of early maturity, shall be packed in accordance with the grading rules covering Fancy grade, as to defects, but regardless of color rules. Sizes not smaller than 163 count for the larger-growing varieties and 200 count the smaller-growing varieties.

All boxes to be lined and cardboard to be used top and bottom, but no cardboard to be used between layers in sizes smaller than 88s. No apples will be accepted in boxes showing infection of worms or cocoons. Apples smaller than allowed in the standard grades,

but otherwise conforming to the requirements of the Extra Fancy or Fancy grades, may be packed if desired by the grower and reported to his district manager. Such apples will be sold as market conditions warrant.

"C" Grade—This grade shall consist of apples not smaller than 163 count and shall be made up of all apples not included in the Extra Fancy or Fancy grades. Apples must be free from all insect pests, worms, worm holes and infectious diseases. Serious physical injuries, skin puncture, bruised or broken skin will not be permitted. Slightly misshapen fruit, slight sunscald and not exceeding two stings, thoroughly healed, and such blemishes as are provided for under the grading rules for Fancy grade, shall be permitted. There are no requirements as to

LILLY'S

BEST GRADE

GRASS AND CLOVER SEEDS

99 PER CENT PURE

FOR FALL SOWING

THE CHAS. H. LILLY COMPANY, SEATTLE

W. van Diem

Lange Franken Straat 45, 47, 49, 51, 61
ROTTERDAM, HOLLAND

European Receivers of American Fruits

Eldest and First-Class
House in this BranchCable Address: W. Vandiem
A B C Code used; 5th Edition

Our Specialties are

Apples, Pears, Navel Oranges



FIX YOUR ROOF

Send for this **FREE BOOKLET**
TELLS HOW TO DO IT EASILY AT SMALL EXPENSE

"KOTE-IT" a rubber-like paint
for roofs, tin, paper or shingle, new or old,
iron work, silos, tanks, posts, implements, etc.

APPLIED WITH A BRUSH

STOP THE LEAK!

50¢ A GALLON DELIVERED IN QUANTITIES
Guaranteed for 5 years

A.W. SMITH CHEMICAL CO.
OAKLAND-BOX 393 A-CAL.

PROTECT YOUR STOCK!!

From the Torture of Flies



Cows Give $\frac{1}{3}$ More Milk —
Horses Do More Work
on Less Feed when Protected by SO-BOS-SO.

Applied in a few seconds at a
cost of less than $\frac{1}{2}$ cent per day
per head.

PORTLAND SEED COMPANY
Portland Oregon



Ask for Catalog No. 206

color except that the fruit must be matured. All apples to be wrapped. No apples will be accepted in boxes showing infection of worms or cocoons.

Recommendation — Your executive board advises the use of the regular Northwestern standard apple box, inside measurements $10\frac{1}{2} \times 11\frac{1}{2} \times 18$, with solid ends. Inasmuch as the laws, as well as the trade requirements, will force us to sell our apples by numerical count, we abolish the system of designating or manifesting fruit by tiers and will employ the numerical count exclusively hereafter. The recognized and endorsed counts for the Northwestern standard apple pack are as follows: 3 tier, 36, 45, 48, 56; $3\frac{1}{2}$ tier, 64, 72, 80, 88; 4 tier, 96, 104, 112, 113, 125; $4\frac{1}{2}$ tier, 138, 150, 163; 5 tier, 175, 188, 200, 213, 225.

Crabapples should be carefully assorted as to varieties, making one grade only, keeping out all insect pests, worm holes, sting, scale, misshapen and blemished fruit. Put up in apple boxes; paper line the box; fill in gently so as to prevent bruising.

Lady Apples—These should be packed in half boxes, boxes lined, remembering that the more attractive the better the sale. Make only one grade, keeping out all insect pests, worm holes, sting, scale, misshapen and blemished fruit.

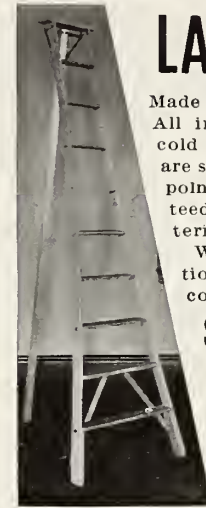
On all packages of fruit other than those of standard and specified weights, and those packed in full standard, dry-measure packages, the grower is warned to stamp on each package the minimum net weight or numerical contents thereof.

CHERRIES

10-lb. Boxes—All marketable varieties must be in perfect condition, of the right degree of ripeness, free from all insect pests and blemishes. Stemless cherries to be kept out. In packing the 10-lb. boxes care must be taken by the packer to have the cherries as near uniform in size as possible all the way through the box. Boxes should be marked according to the number of rows across the end, as in 9 row, 10 row and 11 row. In making the box, top should be nailed on and cleated, bottom left off, box should be placed before packer with open bottom up. Carefully pack the bottom tier, which will be the top when pack is completed. In packing the first tier care should be taken by the packer to place the flattest side of the cherry next to the board. Use only the square pack, never a broken one. Both ends of box should be packed alike. Keep all stems up on first two layers and all stems down on the bottom, which will be the top of the box to the packer. See that the corners are well filled. After box is nailed up there should be no stems showing. Edges of box where cherries are exposed should present a neat appearance. Nailers should be very careful when lidding up not to cut or mash any of the fruit; all such cherries should be removed and replaced with good fruit.

20-lb. or 25-lb. Boxes—Follow same instructions when packing either 20-lb.

SCHLEE'S ORCHARD LADDERS



Made of select vertical grain fir. All iron work made of strong cold bent steel. The Ladders are securely braced in all vital points and absolutely guaranteed against all defects of material and workmanship.

Write for further description and prices. Special discount to the trade.

SCHLEE'S LADDER WORKS

267 Second Street
Portland, OregonManufacturers of
Orchard Ladders, Step Ladders,
Extension Ladders,
Decorating Trestles, Ladder Jacks,
Window Cleaning Ladders,
Roof Jacks

F. A. BISHOP, Secretary
HOOD RIVER ABSTRACT COMPANY
HOOD RIVER, OREGON
ABSTRACTS INSURANCE
CONVEYANCING

It Produces Clean and Sanitary Milk in Ordinary Barns

If you are milking fifteen or more cows, don't do it by hand. It's unsanitary, takes unnecessary time and hard work. With 2 B-L-K Milking Machines, one man can milk 30 cows per hour and not get tired. It protects the milk from dirt and contamination, no matter where in operation. Machines last for years. Cost of operation small. Send for details and list of names of users.

Milker Booklet No. 28 Free.

Monroe & Crisell

HEADQUARTERS FOR DAIRY SUPPLIES
THE SIMPLEX LINE
OREGON SILOS
STAR BARN EQUIPMENT
BABCOCK TESTERS

126 Front Street

Portland, Oregon

or 25-lb. boxes as those given for 10-lb. boxes.

Strawberry Crates—It is recommended that for all cherries that are packed in strawberry crates use the deep-quart hallock, packed sixteen to the crate. Where strawberry crates of four-hallock carriers are used for packing cherries, hallocks should be well filled, shaken down and topped or faced so they will be rounding full. There should be no stems showing. Use square pack.

APRICOTS, YAKIMINES AND NECTARINES

Should be hard ripe for picking. Should be matured enough so they will continue ripening and have a good flavor. Districts using the special folding four-basket hallocks that are straight up and down should pack all large Moorpark, Yakimines and Nectarines in this style package and the pack should be two-tier deep. By use of this package the same sized fruit can be packed in the bottom and top tiers. Crates are to be marked with actual number of fruit in each crate. Size of crate, $3\frac{3}{4} \times 14\frac{1}{8} \times 14\frac{1}{8}$, inside measurement. Size of basket, $3\frac{1}{4} \times 7\frac{1}{4} \times 7\frac{1}{4}$, outside measurement. Box specifications: slats, S. and B., $\frac{1}{4} \times 1\frac{1}{2} \times 16\frac{1}{8}$ —eight pieces; tops, $\frac{3}{16} \times 7\frac{3}{8} \times 16\frac{1}{8}$ —two pieces; ends, $\frac{3}{4} \times 3\frac{3}{4} \times 14\frac{1}{8}$ —two pieces; cleats, $\frac{3}{8} \times \frac{3}{4} \times 14\frac{1}{8}$ —two pieces; size of paper, $7\frac{1}{8} \times 25$. Use 5d cement-coated nails in making all prune crates. The following packs are to be used: Straight pack, 4x4, 2-tier deep, 128 count; diagonal pack, 4x3, 2-tier deep, 112 count; diagonal pack, 3x3, 2-tier deep, 96 count; diagonal pack, 3x2, 2-tier deep, 80 count; diagonal pack, 2x2, 2-tier deep, 64 count. All insect pests, scale, scab, blemishes and physical injuries are to be excluded. Whenever possible use square pack, with stem-end down. Pack top tier with creased side of fruit up and all the same way. Districts not using the special straight crate are to use the regular four-basket prune crate for sizes 6x6 and larger, top tier of fruit to be creased. Same grade requirements as given in special crate.

PRUNES AND PLUMS

Pick as large a percentage as possible with stems on. Throw out all stemless fruit when skins are broken or torn. Pickers should be very careful in picking not to brush off the bloom. Gloves should never be used in handling prunes and plums. Prunes and plums should be hard ripe for picking. Fruit should contain some sugar and be matured enough so it will continue ripening and have a good flavor. Fruit should be free from all insect pests, scale, scab, blemishes and physical injuries. Prunes and plums and all such fruit should be packed in four-basket prune crates unless special order is given by the central office to put them up otherwise. Fruit too small to pack 6x6 should never be packed in prune crates and should only be shipped in $3\frac{1}{2}$ -inch peach boxes, paper lined. Whenever possible use a square pack. Pack all Tragedies and Italians



THE IMPROVED HOOD RIVER BOX NAILING PRESS

Is the Best Device of its kind for the money on the market

The fact that Hood River growers by the hundreds use them, is our best testimonial.

And those who have had experience with the press are satisfied; for by the elimination of box bruises it has aided in making the Hood River apple famous.

If you are in the market for a Nailing Press, it is to your advantage to investigate the HOOD RIVER PRESS and get our prices.

W. G. SNOW
Hood River, Oregon

SHIPPERS OF APPLES PEACHES PEARS PLUMS CHERRIES ETC.

When wishing to use the Cleveland market, or desiring reliable information concerning same, write or wire us. We are among the largest receivers here.

SPECIAL FEATURES:

Absolute responsibility, reliable and prompt service. No house in any market excels us in making prompt remittances when goods are sold. Liberal and consistent advances made on consignments. Ample cold and dry storage facilities.

Myers, Weil & Co.
CLEVELAND, OHIO

KINGMAN & HEARTY, Inc.

E. W. J. HEARTY, President

Commission Merchants Box Apples a Specialty

20 Faneuil Hall Market (North Side)

BOSTON, MASSACHUSETTS



THE only pruner made that cuts from both sides of the limb and does not bruise the bark. Made in all styles and sizes. We pay Express charges on all orders. Write for circular and prices.

Wanted?

If you want a connection with **Practical Distributors** and **Marketers** whose experience covers the entire producing period of the Pacific slope, and who are

Specialists in the Products of Washington and Oregon

Make your wants known to

G. M. H. WAGNER & SONS
123 W. So. Water Street, CHICAGO

Yakima County Horticultural Union

E. E. SAMSON, Manager
North Yakima, Washington

INDEPENDENT SHIPPERS

OF

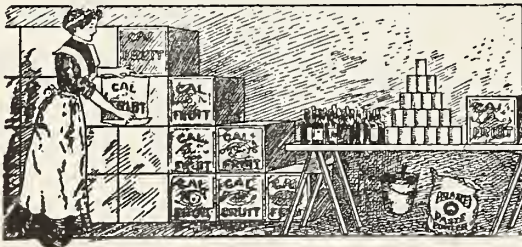
Straight and Mixed Cars Yakima Fruits

CONSISTING OF

Peaches, Pears, Apples, Plums and Prunes

WRITE OR WIRE US TODAY

Paste for Labeling—"Palo Alto" Paste Powder



added to cold water, instantly makes a beautiful, smooth, white paste. Ready for immediate use at a cost of ten cents a gallon. No labor. No muss. No spoiled paste.

Paste Specialists

Robinson Chemical Works
349-351 Eighth Street
San Francisco, California

GO EAST NOW

VIA

Oregon-Washington Railroad & Navigation Co.

O. S. L.—U. P.

LOW ROUND TRIP FARES

Tickets on sale every day to September 30. Final return limit, October 31, 1914. Liberal stop-over privileges.

Superior service, unexcelled dining and sleeping car accommodations, through trains, direct routes, automatic block signals, every requisite for safety and comfort.

Visit Yellowstone National Park on your way East. Through sleeping car service to and from Southern entrance to the park.

For full information, fares, routes, train schedules, etc., call upon any agent of the

O-W. R. & N.



3-tier deep, stem-end down; pack top tier with creased side up and all the same way. Hungarians, Bradshaws, Peach Plums and similar varieties that pack smaller than 5x5 in prune crates should not be packed.

PEACHES

Peaches should be picked for packing only when fully developed, but firm or hard ripe. Yellow-meated varieties should show some yellow color. The fruit should be picked and laid, not dropped, in the baskets or pails, and should be taken from the vessel only at packing table. All possible care should be used to avoid bruises. Use standard peach boxes, cleats on top only; use 4d special orange-box cement nails for bottoms and sides. Drive nails one inch from corner, four nails to each piece. Use three 4d cement box nails for each cleat, one in the center and one driven two inches from the end of the cleat. The cover should hold the fruit firmly in the box, but should not bulge more than three-eighths of an inch. Use 4½-inch boxes only for Elberta peaches, running 50 to 84, both inclusive, avoiding the use of extra cleats except in extreme cases. Peaches that are too large to be laid five wide in the box should be packed two and three in 4½-inch boxes. If the peaches are roundish, as in the case of Crawfords, it will be necessary to use some 4-inch boxes with this pack. Peaches that will go five across the box or smaller should be packed three and three in 4-inch boxes. The excellence of the pack depends upon uniform grading. The peaches in a box should not vary more than one-eighth of an inch in diameter. All peaches must be carefully wrapped in suitable paper. Peaches that run less than 96 to the box must not be packed for shipment. Eighty-four count must be the minimum for Elbertas. In packing the box should set on an incline with the lower end of the box to the packer. Both tiers should be carried forward together. The peaches should be placed in the box stem-end down, those in the top tier resting in the spaces between those in the lower tier so that no peach will rest squarely on top of another. Pack all peaches with the loose end of the wrapper down. No overripe, under-sized, immature, bruised, misshapen,

Store Your Apples in Spokane

The Natural Storage Center

Take advantage of storage in transit rate and the better market later. Write us for our dry and cold storage rate and information.

Ryan & Newton Company

Spokane, Washington

WELCH & WELCH 3-5 W. So. Water Street CHICAGO

SPECIALIZE ON CAR LOTS

Apples, Peaches, Pears

Get in touch with the
Livest House in Chicago
Write Today

Members { National League Commission Merchants
Western Fruit Jobbers and
International Apple Shippers Association

True-to-Name Nursery

GALLIGAN BROS.
Proprietors

Hood River-Dufur, Oregon

Wholesale and Retail General Line of
Nursery Stock. Seventeen years in the
business. For catalogue and prices
write

True-to-Name Nursery

Hood River, Oregon

BUY AND TRY

White River Flour

MAKES

Whiter, Lighter
Bread

diseased, wormy or otherwise defective fruit should be packed. Overripes may be packed for special purposes with the letter "R" marked on the end of the box. But only load overripes as instructed. The variety, numerical count and grower's name to be placed on the label-end of the box with rubber stamps.

CANTALOUPE

If this important industry is promoted more care must be used in grading and packing. It is absolutely necessary that a standard grade be adopted as well as a standard of pack. The commercial counts as recognized for cantaloupes are: The 36 count of "Jumbos"; the 45 count of "Standards"; the 54 count of "Ponies." There must be a straight pack, uniform size cantaloupes in each grade, clean and at a stage of uniform ripeness that will permit long-distance shipping.

PEARS

Standard boxes, 8½x11½x18, inside measurements, only to be used. In making up boxes use 24 cement-coated 6d regular nails. The three grades, Extra Fancy, Fancy and C grade, to be used, only the three varieties showing size limit, listed under the Extra Fancy column in the following table, to be packed in the three grades. The remainder of the varieties to be packed in the Fancy and C grades. Extra Fancy grade defined: Pears to be packed in this grade to be hand picked, clean and sound, free from insect pests, sun damage, broken skin, scale, scald, worms, worm stings, infectious diseases, limb or leaf rub, misshapen fruit and all other defects equally detrimental. Fruit bruised or punctured or showing other evidences of rough handling will not be permitted in this grade. Pears must have stem or part of same intact.

D'Anjou—Pears that show a characteristic russetting at blossom end may be packed in this grade when they have all the other necessary requirements, provided the russetting does not extend out of the bowl onto the cheek of the pear, and provided that this russetting is not larger than three-quarters of an inch in the aggregate. Two very slight leaf scratches, neither to exceed one-fourth of an inch in length, or one not

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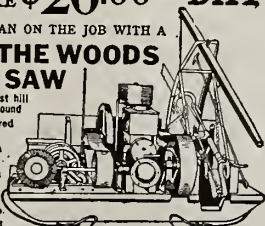
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46 ricks in 10 hours.
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in 9 hrs.
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Makes 1,500 to 2,000 gallons for Pear Thrips, with addition of three per cent distillate oil emulsion; or about 1,000 gallons for Green Aphis, Pear Psylla, Hop Louse, etc., or about 800 gallons for Black Aphis and Woolly Aphis—with addition of three or four pounds of any good laundry soap to each 100 gallons of water.

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If you cannot obtain "Black Leaf 40" from a local dealer, send us P. O. Money Order, and we will ship you by express at the above prices (for the United States), prepaying the expressage to your nearest railroad town in the United States. There is a duty charged on all shipments made into Canada.

The Kentucky Tobacco Product Company

INCORPORATED

Louisville, Kentucky

to exceed one-half inch in length, or a slight defect that shows only a slight discoloration of the skin and not larger than the end of a pencil, will not bar the pear from the Extra Fancy grade, providing the scratch or defect does not come on the cheek of the pear. For size limits and weights see Pear Table.

Fancy—This grade must be hand picked, clean and sound, free from insect pests, sun damage, broken skin, scald, scale, worms, worm stings, infectious diseases and all other defects equally detrimental, excepting that slight limb or leaf rub, scratches or russetting will be permitted, provided no pear shall show total blemish aggregating more than than three-quarters of an inch in diameter. Pears must have stem or part of stem intact. Fruit clearly misshapen, bruised or bearing evidences of rough handling will not be permitted in this grade. The amount of russetting allowed at the blossom end under the Extra Fancy rule will have no bearing on the total amount of blemishes or russetting allowed in the Fancy—that is, it will not be counted in on the total of the three-quarter-inch square mentioned above in this grade. Winter Nelis, Buerre Bosc and other varieties that have the same characteristic russetting over the entire surface; the russetting will not be counted in the totaling of the amount of blemishes allowed. For size limit and weights see Pear Table.

"C" Grade—This grade to consist of all merchantable pears not included in the Extra Fancy or Fancy grades, but must be free from worms, scale, stings or other insects pests. Slightly misshapen pears, or pears having limb rub or other defects not spoiling the merchantable quality of the fruit, will be accepted. Punctures or skins broken at stem must be kept out. Fruit bruised or showing other evidences of rough handling will not be permitted in this grade.

Seckel Pears—These should be packed in half boxes, the top faced and then the box filled gently so as to prevent bruising. All boxes to be lined and to be graded according to Fancy specifications. For size limit and weight of different varieties see Pear Table.

Compatibility of Insecticides

Continued from page 10

senicals, except with the neutral lead arsenate, which is not affected by the alkali of the soap.

Emulsions.—The above remarks applying to coaps obviously may also be applied to the soap emulsions, with the added danger that the emulsion may be broken and injury result both from the soluble arsenic and the separated oil.

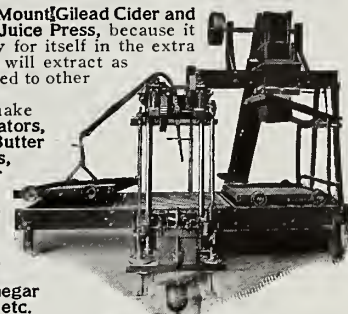
Contact Insecticide-Fungicide Combinations

Lime-Sulphur-Bordeaux.—This combination has been used with some success for the control of apple scab, but with more or less injury to the fruit. Definite classification must be deferred until more information is available. This subject brings to mind a "hard nut to crack" that was sent in to the insecticide laboratory in the form of a question by one of the county horticultural commissioners. The lower limbs of certain trees had been sprayed with bordeaux mixture as a check against the brown rot, either just before or just after spraying with lime-sulphur for red spider. It was noted that if the two sprays were applied within a week or so of each other a brown deposit was formed on the leaves and twigs where the two sprays came together. It was assumed that the deposit was copper sulfid. Now the question was whether this reaction would lessen the efficiency, either of the fungicide or of the insecticide. Questions of this sort are interesting from a chemical standpoint and are of considerable practical moment. Accordingly the literature was looked over and a few experiments were made and the reply given substantially as follows: "So far as known to the writer, this reaction has not been studied from a chemical standpoint. To predict the products of the combination with certainty seems out of the question for mixtures of such complexity. It seems very probable, however, that a sulfid of copper is one of the products. Under certain conditions, free sulphur, thiosulphates and sulphates of both copper and calcium would also be among the products. A few rough experiments made in the laboratory indicate that variations in the proportions of the two constituents made a great difference in the appearance of the final product. No very definite statement is therefore ventured. Various mixtures, loosely spoken of as "copper sulfids," have been made and experimented with by different workers and they all are said to possess marked fungicidal value. It would seem that the two sprayings under consideration would lessen the value of the lime-sulphur by removing some of the sulphur to form new compounds with copper, but that the new copper compounds would be efficient fungicides." In reply the propounder of the question wrote as follows: "My field observations have certainly been that the efficiency of the combination against red spider, for which the sulphur fumes are essential, is greatly less than that

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with a Mount Gilead Cider and Grape Juice Press, because it will pay for itself in the extra juice it will extract as compared to other makes.

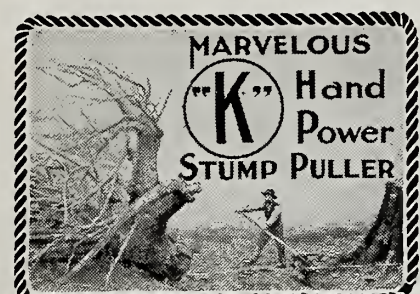
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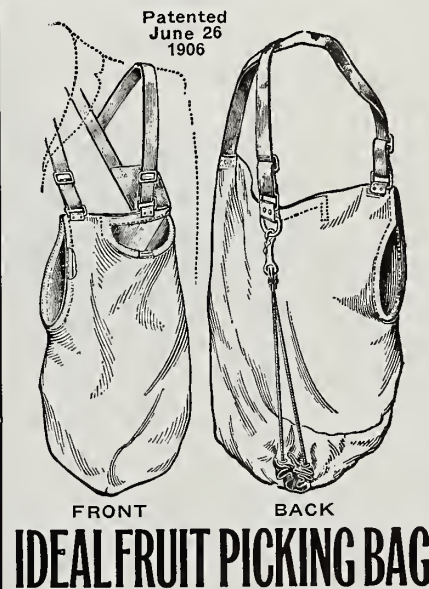
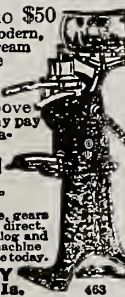
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This is the best and handiest arrangement for picking fruit that has ever been offered. A trial will convince even the most skeptical.

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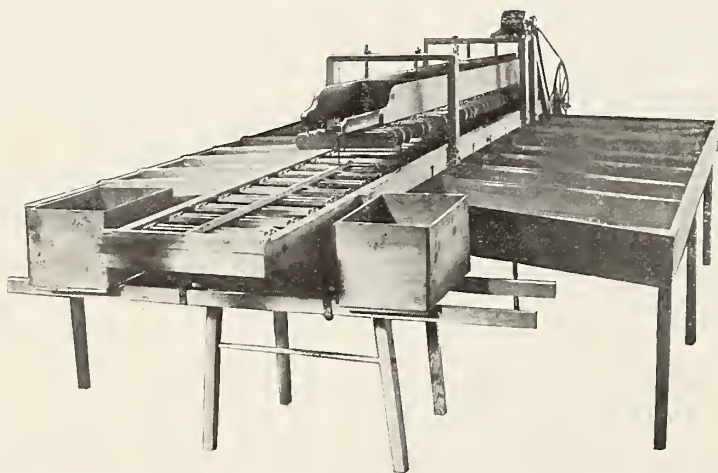
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Is the most simple and economical sizer on the market today. Experience has demonstrated that sizing to eight divisions is more practical than a greater or less number of divisions and enables packers to pack the maximum quantity per day, thereby reducing the cost.

The sizing is done **ABSOLUTELY WITHOUT BRUISING**.

The sizer is strongly and simply constructed, with no complicated machinery to get out of order, and will last a lifetime.

The machines will make two grades at the same time and divide each into eight sizes.

The construction is so simple that the machine can be operated with $\frac{1}{30}$ -horsepower motor—either electricity, gasoline engine, or by hand.

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of lime-sulphur alone. We have not been able to get any definite line on its fungicidal value." Considerable time has been devoted to the discussion of this topic of lesser importance, but it brings up so many questions of interest that it is hoped the speaker may be pardoned for thus presenting the subject so much in detail.

Emulsion-Bordeaux.—A foreign reference is at hand in which this combination is reported to have been used with success.

Soaps-Bordeaux.—Soap has been recommended as an addition to bordeaux mixture to increase the spreading and adhesive qualities of the fungicide. Resinous soaps are to be preferred, as the copper resinate (insoluble copper soap) is more easily handled by the spray machinery. No injurious effects to the foliage or fruit are to be anticipated with this combination.

Tobacco-Bordeaux.—This combination is advised against for two reasons: First, copper is a precipitant for nicotine and it is believed will render the alkaloid inert; second, certain tobacco extracts containing much extractive matter may have a solvent action upon the copper of the bordeaux mixture and disastrous results may attend its use from the burning effect of the dissolved copper. It is quite probable that the above remarks may also be applied to paris green-tobacco combinations, although it may be that the less soluble paris green would not be so susceptible to the action of tobacco extracts. Time was not available to determine this point by laboratory experiments in time for incorporation in this paper, nor was this combination mentioned in the reports of experiments made with spray combinations which were reviewed.

General Discussion of Soaps

In order to more fully understand the effect of soaps and soap emulsions upon other spray materials a little of your time is asked to consider the composition of soaps. Soaps, as is well known, are made by simple mixtures or by boiling together either potash or soda lye with a fat or oil or resin. We may then consider the composition of the fats and oils rather briefly. The vegetable and animal fats and oils which



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are suitable for making soaps are rather complex compounds, but for the purpose of this discussion may be considered to be composed of two important constituents of opposite chemical characteristics: (1) Glycerine, which is chemically known as a weak base and (2) a fatty acid, the kind of acid depending upon the kind of fat or oil. The lyes used in making soap are strongly basic compounds in which the alkali metal (potassium or sodium) is the base. They may or may not also have an acidic component. Bases possess different degrees of chemical activity and may be strong or weak bases. The stronger bases have the habit of replacing the weaker ones in a chemical compound. Other causes than the above also have to do with the replacement of one base by another, but to take up this would lead us too far from the subject. The potassium and sodium bases are very strong bases, while glycerine is a weak base, so that when the conditions are right the potassium or sodium of a lye will replace the glycerine of a fat or oil and enter into chemical combination with the fatty acids. Now this is just what happens in the process of soap making. (In the case of resin, oleic acid, etc., these substances have no base, but are of an acidic nature and will unite directly with the alkali bases to form a soap.) A soap, then, may be considered to be a fat or an oil in which the weak-base glycerine has been replaced by a stronger metallic base. Now it happens that the only soaps which will dissolve in water are the potassium and sodium soaps. Soaps of the other metals (such as lead, lime or copper soaps) are also readily formed, but these are all gummy, sticky masses, entirely insoluble in water and unsuitable for the preparation of spray mixtures. Furthermore, if any soluble form of lead, lime, copper, iron or any of the metals, except potassium or sodium, comes in contact with a dissolved soap the soap is broken up and an insoluble soap is formed corresponding to the metal. That is, a lead, lime, copper, iron or other insoluble soap. These soaps of

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the non-alkali metals, being insoluble in water, form a curd and are of no value as detergents or for spraying. A familiar instance of this kind is the "curdling of water" when soap is put into hard water. The hardness of water is usually due to some soluble salt of lime or magnesia, and when these come in contact with the soluble soap the insoluble lime or magnesia soap is formed and is the "curd" of hard waters.

Soaps-Lime-Sulphur.—The "curdling" of hard waters just alluded to is precisely the same kind of a change that takes place when soap is added to lime-sulphur solution. An insoluble lime soap is formed that destroys the usefulness of the mixture. Practically all of the sulphur will be thrown out of a lime-sulphur solution by this treatment. The new compounds are not especially dangerous to use, but are apt to clog the spraying apparatus and the sulphur is no longer evenly distributed throughout the liquid.

Emulsions - Lime - Sulphur. — If the emulsion is a soap emulsion the soap of the emulsion will be broken up, as in the case of lime-sulphur, and the emulsion destroyed, setting free the oil and precipitating the sulphur. There is present the possibility of foliage injury, due to the uneven distribution of the oil.

Soap-Iron Sulfid. Soap Emulsions-Iron Sulfid.—The two combinations above are incompatible for much the same reasons as are the two previous ones, but to a lesser degree.

Tobacco-Lime-Sulphur.—Compatible.

Tobacco-Iron Sulfid.—Compatible.

This completes the discussion of the main part of the table. For convenient reference, however, the general effect of the alkalies and acids upon the various remedies is also indicated and will be gone over rapidly. This part of the table is given with the idea that it may be of service as a warning against some mistakes that might very easily be made, such as pouring lime-sulphur into an "empty" vinegar barrel or working up acid lead arsenate in a pot in which there is left the remains of the last batch of soap.

The Effect of Acids on the Fungicides

Bordeaux.—The common acids (with the exception of carbonic acid) dissolves the precipitated copper of bordeaux mixture.

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G. J. Kaufmann, Manager

Lime-Sulphur.—All acids, including carbonic acid, precipitate free sulphur from lime-sulphur solutions.

Iron Sulfid.—The stronger acids dissolve the iron sulfid of the paste, liberating hydrogen sulfid.

Effect of Alkalies on the Fungicides

Bordeaux.—Excess of the strong alkalies dissolve the precipitated copper of bordeaux mixture and form new compounds which are suitable for use in many instances, if the necessary caution is used.

Lime - Sulphur.—Lime - sulphur is broken up by the strong alkalies.

Iron Sulfid.—The strong alkalies will dissolve the precipitated sulphur of the paste and form caustic compounds.

The Effect of Alkalies and Acids on the Arsenicals

All of the arsenites are more or less decomposed by either acids or alkalies, producing soluble forms of arsenic. The acid lead arsenate is unstable in the presence of alkalies, while the neutral form is unstable in the presence of acids.

The Effect of Alkalies and Acids on the Contact Insecticides

Emulsions.—Emulsions are broken up by either alkalies or acids and the liberated oil may cause injury on account of uneven distribution.

Soaps.—More alkali added to a soap will not affect its properties. If injurious effects are produced it will be from the alkali and not from the change in composition of the soap. Soaps are decomposed by the strong acids. The fatty acids are freed from the base and are no longer a part of the soap.

Tobacco.—It is believed that alkalies would have no effect on free nicotine in extracts. Nicotine sulphate, however, would be decomposed by alkalies. The sulphate part of the compound

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The Hood River Apple Sizer

It will reduce the labor of grading and sizing from 20 to 30 per cent after crop is in the apple house, making the little machine save \$2.50 to \$5.00 per day.

The Hood River Apple Sizer is simple in construction and operation—with no complicated machinery to get out of order. It is small and compact, occupying a space of 4½x6 feet so it can be used in any pack-

ing house, no matter how small. With extra help it has a capacity of 500 boxes per day and the cost of grading and sizing can be done for 3c per box. The price is so low that every grower, no

matter how small, cannot afford to be without it. ANY GROWER WITH A 1,000 BOX CROP CAN SAVE THE COST OF THE MACHINE IN ONE YEAR.

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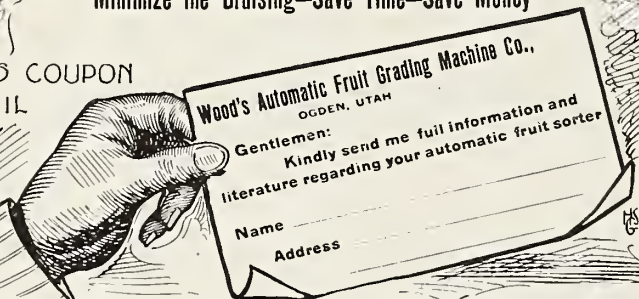


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would unite with the alkali and the nicotine would be set free. In this form the alkaloid would be just as active and probably more so, but would be more liable to lose by volatilization. Acids would have no effect upon the different tobacco preparations.

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Paris green as well as the copper of bordeaux mixture are readily soluble in solutions of cyanid. Copper compounds in general form complex soluble salts with cyanids and soluble copper is injurious to foliage. Trees sprayed with any form of copper should not subsequently be fumigated with cyanid without the lapse of at least one year on account of the solvent action of the cyanid on the copper. So far as known there is no danger of this character from the use of the other sprays.

Need of Chemical Assistance in Study of Insecticides and Fungicides

During the past two years an effort has been made to arrange a card index of the references in agricultural and chemical literature to insecticides and fungicides and allied topics. As a result many thousands of cards have been collected. But in this collection surprisingly few cards are found referring to articles which discuss the chemical composition of insecticides or their toxic action upon parasites and the hosts of parasites. The number of references to articles on spraying experiments, when, how and what to spray, etc., is very large. This work has been done mostly by the entomologist, the plant pathologist and the horticulturist, whose training and viewpoints are not chemical. The effect of remedies upon parasites and host has been carefully observed and this or that procedure has been recommended or condemned as the result of practical experiences. In many cases the reasons

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for a decision concerning the suitability of a remedy have been very obscure and the subject of much speculation. Conflicting results have been very often obtained without apparent cause. The weather, the method, the remedy and the time of application have all been blamed as the cause of failures. These are doubtless all great factors influencing the success of spraying practice. Chemical advice has sometimes been asked and some of the points elucidated. This advice is frequently given after making some simple laboratory tests without any very extended investigation. The chemist's time and attention is usually well occupied in the investigation of other problems and his assistance is given by way of making a few determinations to confirm theories and work of this character is gotten out of the way as soon as possible in order to go on with the regular work. Of recent years the need of chemical aid has become more and more apparent to assist in the solution of some of the vexing problems that confront the worker in this line of activity. Much of the work incident to the administration of the federal insecticide law and the insecticide and fungicide laws in operation in a dozen of more states is of a chemical nature, and has created an absolute necessity for a more comprehensive knowledge of the materials which these laws seek to control. And so there are now a few chemists who are devoting considerable time to the study of insecticides and fungicides and valuable articles are beginning to appear, written from their standpoint. Most of their time must necessarily be devoted to the origination and perfection of methods of analysis, but it is to be anticipated that our knowledge of these important agricultural materials may be greatly

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amplified and that the valuable work of the entomologist, the plant pathologist and horticulturist may be supplemented by the work of the chemist.

Acknowledgements

No originality is claimed except in the manner of classification and in the arrangement of the table, which is thought to be in the most convenient form for reference. The table is given as being the consensus of opinion found in the published reports of the different experimenters throughout the United States, supplemented by personal consultation with experts in this line of work, and partially verified by investigations made in the insecticide laboratory of the University of California. The information has been collected from so many sources that individual acknowledgements would involve the incorporation of an unwieldy bibliography and could not well be made complete. Grateful acknowledgement is therefore made to all of the government and state experiment station workers who have contributed a share in investigating these problems; to the county horticultural commissioners, and to my associates, who have made valuable suggestions in the classifications.

Conclusion

It must be admitted with chagrin that our chemical knowledge of insecticides and fungicides is yet too imperfect to predict with absolute confidence the results to be obtained from the use of a new material or an untried combination of materials. The final decision must be made as the result of carefully planned practical field experiments. The table of compatibilities is therefore presented with considerable hesitation for the first time, and is offered for your criticism, in order that if any of the classifications are incorrect, or do not correspond with your experiences, the matter may be discussed and the faults corrected.

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